SIMULATION AND DESIGN OF MICROBOLOMETERS

FOR 5-14 μm WAVELENGTH AT OBLIQUE INCIDENCE

By

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Abstract

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Arkadeep Mitra, MS THESIS

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A mathematical model was developed to calculate the total power absorbed and total power reflected for a microbolometer for oblique incidence of light viz. s and p polarization by varying the angle of incidence from 1^0 to 89^0. The mathematical model was simulated using matlab in five different sensor structures. A comparative study based on simulation involving the different sensor structures was done. The maximum partial absorbed power for s polarization was 0.9559-0.0000i, 0.9112-0.0000i, 0.9617-0.0000i, 0.3057-0.0000i, 0.9627-0.000i for sensor structure I, 1, 2, 3, 4 at angle of incidence of 73 degree, 1 degree, 66-67 degree, 1-3 degree, 60 degree for wavelength of 8 µm, 7 µm, 9 µm, 8 µm, 14 µm. The maximum partial absorbed power for p polarization was 0.9855-0.0000i, 0.9113-0.0000i, 0.9979-0.0000i, 0.3057-0.0000i, 0.9982-0.000i for sensor structure I, 1, 2, 3, 4 at angle of incidence of 68 degree, 1 degree, 73 degree, 1-3 degree, 39-40 degree for wavelength of 8 µm, 7 µm, 8 µm, 8 µm, 10 µm. The design aspect of the microbolometer was looked upon by replacing the existing sensor layer materials with some other materials and by doing performance comparison.

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April 21, 2017

To my parents – M. K. Mitra and Soma Mitra

To my nephew - Shlok

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CHAPTER ONE

INTRODUCTION

Infrared detectors work in either one or multiple Infrared regions viz. Near IR (0.7 – 1.7 µm), Mid-IR (1.7 – 5 µm), Long-IR (5 – 12 µm) and Far – IR (12 – 500 µm) [1]. Infrared detectors are classified into IR Photon Detectors and IR thermal Detectors. IR Photon Detectors are fast, cooled, more sensitive and expensive [2]. Photoconductors, Photo-diodes are some of the examples of IR Photon Detectors. IR thermal detectors are slow, less sensitive, uncooled and comparatively inexpensive, when compared to Photon detectors [2]. Microbolometers, pyroelectric detectors are some of the examples of IR thermal detectors [2].

Light predominantly consists of photon carriers and thermal carriers [3]. In the wavelength range of 5 – 14 µm, the generation of thermal carriers, dominates over the generation of photon carriers. Hence in this thesis, we study the performance of microbolometers in the range of 5 – 14 µm.

Microbolometers consists of absorption of the incident radiation, converting it into thermal energy, whereby producing an electrical signal as the output [2]. Microbolometers as thermal IR cameras find widespread usage in surveillance, defense, space, medical industries. The operation of microbolometers predominantly centers around the photon-phonon interaction [2], causing an increase in temperature, whereby bringing a change in the electrical characteristics. Packets of light are known as photon. Frequency and crystal momentum are the two characteristics that define the existence of quantized lattice vibrations or phonons. Photons and Phonons, share many similar and dissimilar characteristics. The similar characteristics being that both exist as bosons (in same quantum state), exhibiting wave-particle duality, easily created and destroyed [4]. The dissimilar characteristics being that for phonons the crystal geometry determines energy – momentum relationship, energy – momentum relationship of photons is mathematically represented as $E = pc$ whereas phonons exhibit more complicated energy – momentum relationship (acoustic and optical), the first Brillouin Zone defines phonon momentum, x- axes of curve below [4].

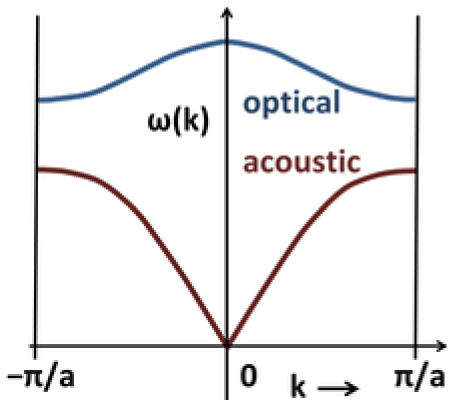


Figure 1-1 frequency versus k graph of phonons [4]

Heat and sound information are conveyed by phonons. Increase in temperature causes the generation of more phonons. The Planck's relationship for phonons is as follows [4]:

$$< n >_{\omega} = \frac{1}{e^{\frac{\hbar\omega}{K_B T}} - 1} \tag{1.1}$$

$< n >_{\omega}$ = expectation number of phonons for a given frequency at a certain temperature; K_B = Boltzmann constant

$$C_V = \frac{\partial U}{\partial T} = \frac{\partial}{\partial T} \sum_p \sum_k \hbar\omega_k \frac{1}{e^{\frac{\hbar\omega_k}{k_B T}} - 1} \tag{1.2}$$

$$K_{ph} = \frac{C v_s l}{3} \tag{1.3}$$

The structure of a microbolometer consists of a sensing material that is connected to the Si substrate through a resistor material. The presence of a mirror in a microbolometer, positioned above the Si substrate with or without the gelling material, helps in reflecting the maximum radiation to the sensing material. The presence of filtering optics in the front of microbolometer, allows just the incoming IR radiation to pass to the microbolometer [5]. Conduction, convection and radiation are the three mechanism of heat transfer in a microbolometer, efforts are made to limit convection, by incorporation of packaging layer [5].

A sensing material with a high TCR (Temperature Coefficient of Resistance) is desirable, as it gives high resistance. Some of the sensing materials that are commonly used include: a-Si (-2.8 %/K, 2%), YBaCuO (-3%/K at 290K), VOx (2.5%), SiGe (2%). SiGe and a-Si have the same TCR (2%) [6, 7]. SiGe is used in some of the cases as it exhibits lower thermal conductivity. Amorphous silicon has its own advantages, of remaining robust below 250^0 C [5]. Semiconductors exhibit a negative TCR. A negative TCR lowers the thermal conductivity or electrical resistivity of material with increase of temperature. Materials like V_2O_5-V-V_2O_5, produced by pulsed laser deposition, exhibit a TCR of 5.12% [7].

For more lesser thermal conductivity, the sensing material is suspended over the Si substrate, by means of a sacrificial layer. The resistor connecting the sensing material to the Si substrate, consists of a material having low thermal conductivity and having a high tensile strength [5]. Some of these resistor materials include Alumina [8] and SiC [8, 9]. In certain microbolometers mesa structures are incorporated to achieve low thermal conductance and low thermal capacitance. Efforts are made, so that the legs connected to substrate are made long and skinny. The distance between sensing material and ROIC substrate is an integer multiple of $\lambda/4$.

Al, Au, VO_2, TiW are some of the commonly used mirror materials in the microbolometer structures.

As per Kirchhoff's law if a body is at equilibrium with its surroundings, law of conservation of energy applies [10]:

$$\Phi_{incident} = \Phi_{absorbed} + \Phi_{reflected} + \Phi_{transmitted} \quad (1.4)$$

Dividing both sides by $\Phi_{incident}$,

$$\alpha + r + t = 1 \quad (1.5)$$

α = absorbance, r = reflectance, t = transmittance

For an opaque body, t = 0: $\alpha + r = 1 \Rightarrow \alpha = 1 - r$ (1.6)

Emission of less radiation at thermal equilibrium takes place, if a body doesn't absorb all the radiation, that is falling on it [10].

$$Watt_{absorbed} = \alpha * E * AREA_{detector} = \varepsilon * M * AREA_{detector} = Watt_{radiated} \quad (1.7)$$

Where ε = emissivity; M = exitance; E = irradiance

Emissivity being a dimensionless number that is less than or equal to one, defines the ratio of the exitance of actual source and blackbody at the same temperature [10].

$$\varepsilon(\lambda,T) = \frac{M_{e,\lambda}(\lambda,T)_{source}}{M_{e,\lambda}(\lambda,T)_{blackbody}} \quad (1.8)$$

Planck's law for blackbody radiance as a function of wavelength (λ) for energy (e) derived radiance (L_e) is as follows [10]:

$$M_{e,\lambda}(\lambda,T) = \frac{2\pi hc^2}{\lambda^5[e^{\frac{hc}{\lambda kT}} - 1]}[\frac{watt}{cm^2 - \mu m}] \quad (1.9)$$

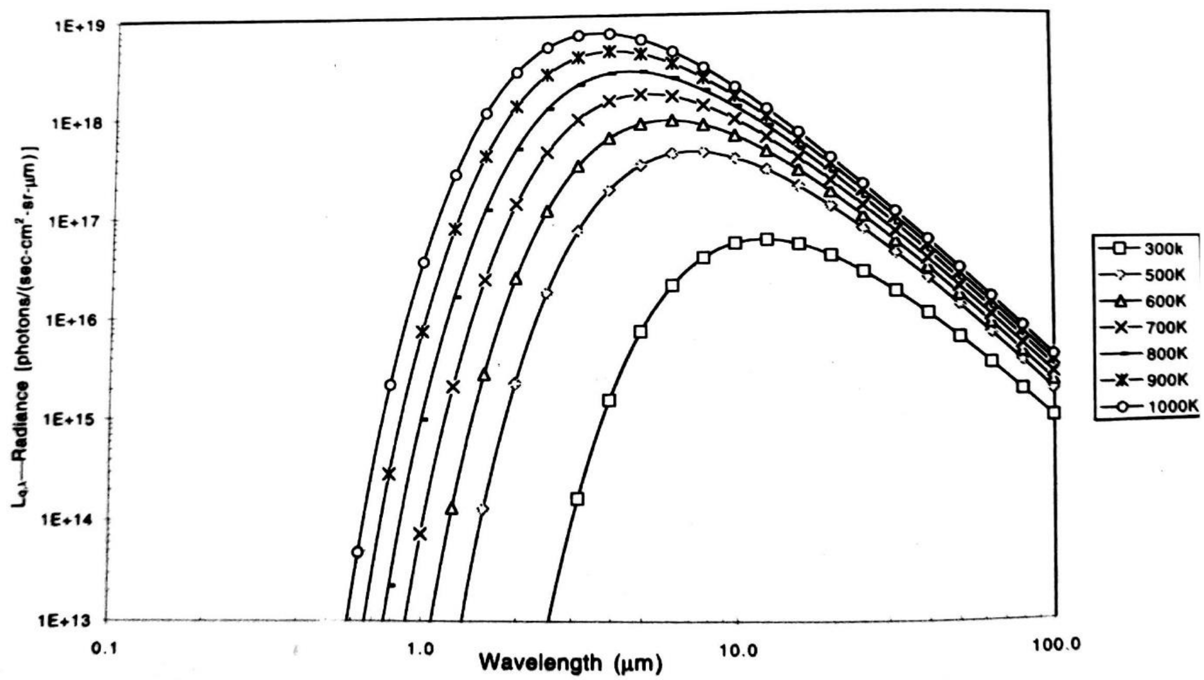


Figure 1-2 Radiance versus wavelength curve for temperatures varying from 300k to 1000k [10]

The Wein's Displacement law [10] describes with increase in temperature, the decrease in the wavelength of peak exitance and can be mathematically expressed as:

$$\frac{\partial M_{e,\lambda}(\lambda,T)}{\partial \lambda}=0 \tag{1.10}$$

$$\lambda_{\max}=\frac{2898\mu mK}{T} \tag{1.11}$$

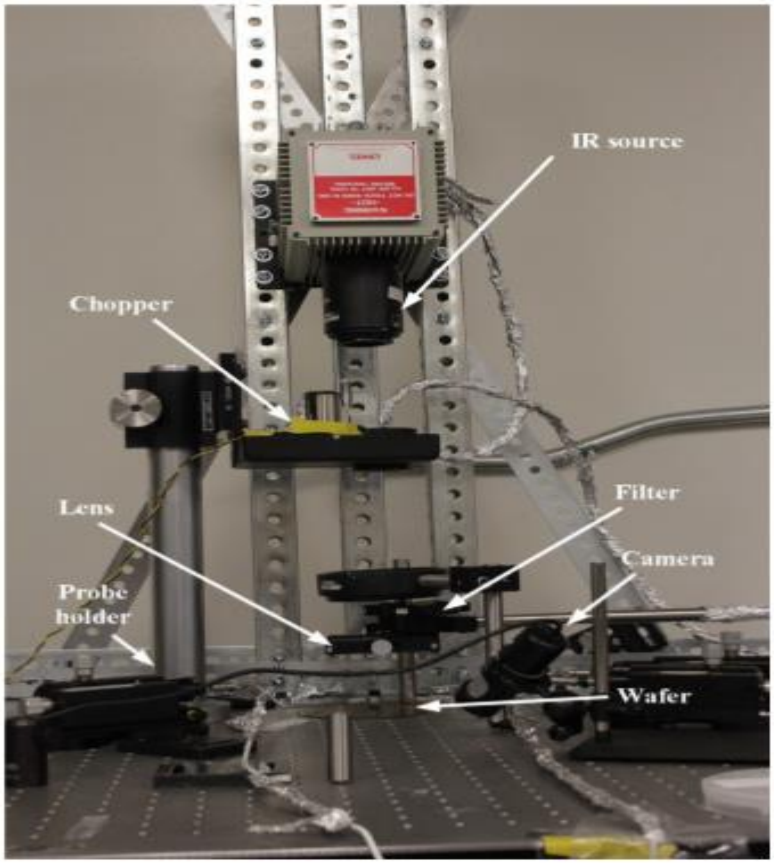


Figure 1-3 IR probe station that is used for characterization of microbolometer [5]

Figures of Merit of Microbolometers [1]

Responsivity (R_V) = V_0/Φ_0 = $\frac{\eta I_{bc} R_b \beta}{G_{thc}} * \frac{1}{\sqrt{1+\omega^2\tau_{thc}^2}}$ (1.12)

Φ_0 = input flux, V_0 = output voltage, G_{thc} = thermal conductance, R_b = bolometer resistance, β = temperature coefficient of resistance, I_{bc} = biasing current, ω = input radiation frequency, τ_{thc} = time constant, ŋ = absorptivity

$$\tau_{thc} = \frac{C_{thc}}{G_{thc}} \quad (1.13)$$

C_{thc} = thermal capacitance

Choice of material with a high TCR is desired.

Detectivity (D) [1, 5]

$$D = \frac{R_V \sqrt{A}}{[\frac{V_n}{\sqrt{\Delta f}}]} \qquad (1.14)$$

V_n = noise voltage over electrical bandwidth of Δf; A = area of detector; Noise per unit bandwidth, normalized to area, normalized w.r.t size and normalized w.r.t noise; cannot increase area indefinitely, as it causes heating up affecting performance

Noise Equivalent Power (NEP) [5]

$$NEP = \frac{\sqrt{A\Delta f}}{D} \qquad (1.15)$$

A = area of detector, Δf = electrical bandwidth, D = detectivity

Noise occurring in microbolometers

$$V_N = \sqrt{V_J^2 + V_{1/f}^2 + V_{TH}^2 + V_{PN}^2 + V_{ROIC}^2} \qquad (1.16)$$

V_N = total noise of a bolometer, V_J = thermal noise, $V_{1/f}$ = 1/f noise, V_{TH} = temperature fluctuation noise, V_{PN} = photon noise, V_{ROIC} = readout circuit noise

Thermal Noise (V_J) [11]

$$V_J = \sqrt{4kTR_b(f_2 - f_1)} \qquad (1.17)$$

k = Boltzmann constant, T = membrane temperature, R_b = bolometer resistance, f_1 = lower limit of frequency bandwidth, f_2 = upper limit of frequency bandwidth

1/f Noise ($V_{1/f}$)

$$V_{1/f} = \sqrt{KVb^2 \ln(f_2 / f_1)} \tag{1.18}$$

Vb = bolometer voltage, K = 1/f coefficient, $f_1 \approx 1/4t_{stare}$, t_{stare} = correction period of reference output, $f_2 = 1/2t$

Temperature fluctuation noise (V_{TH}) [1]

$$V_{TH} = \frac{R_V}{\eta} \sqrt{4kT^2 G_{thc} f_{TF}} \tag{1.19}$$

G_{thc} = thermal conductance, k = Boltzmann constant, f_{TF} = thermal equivalent noise bandwidth, $f_{TF} = 1/4\,\tau_{thc}$, τ_{thc} = time constant, R_V = responsivity

Photon noise (V_{PN})

$$V_{PN} = R_V \sqrt{\frac{8A\sigma k(T^5 + T_{BKG}^5) f}{\eta}} \tag{1.20}$$

A = area of detector, σ = Stefan-Boltzmann constant = $5.67*10^{-8}$ W/m^2 K^4, T_{BKG} = background temperature, R_V = responsivity

CHAPTER TWO

MATHEMATICAL MODELLING OF MICROBOLOMETERS

2.1 s-polarization

In case of s-polarization, the incident electric field is perpendicular to the plane of incidence [12].

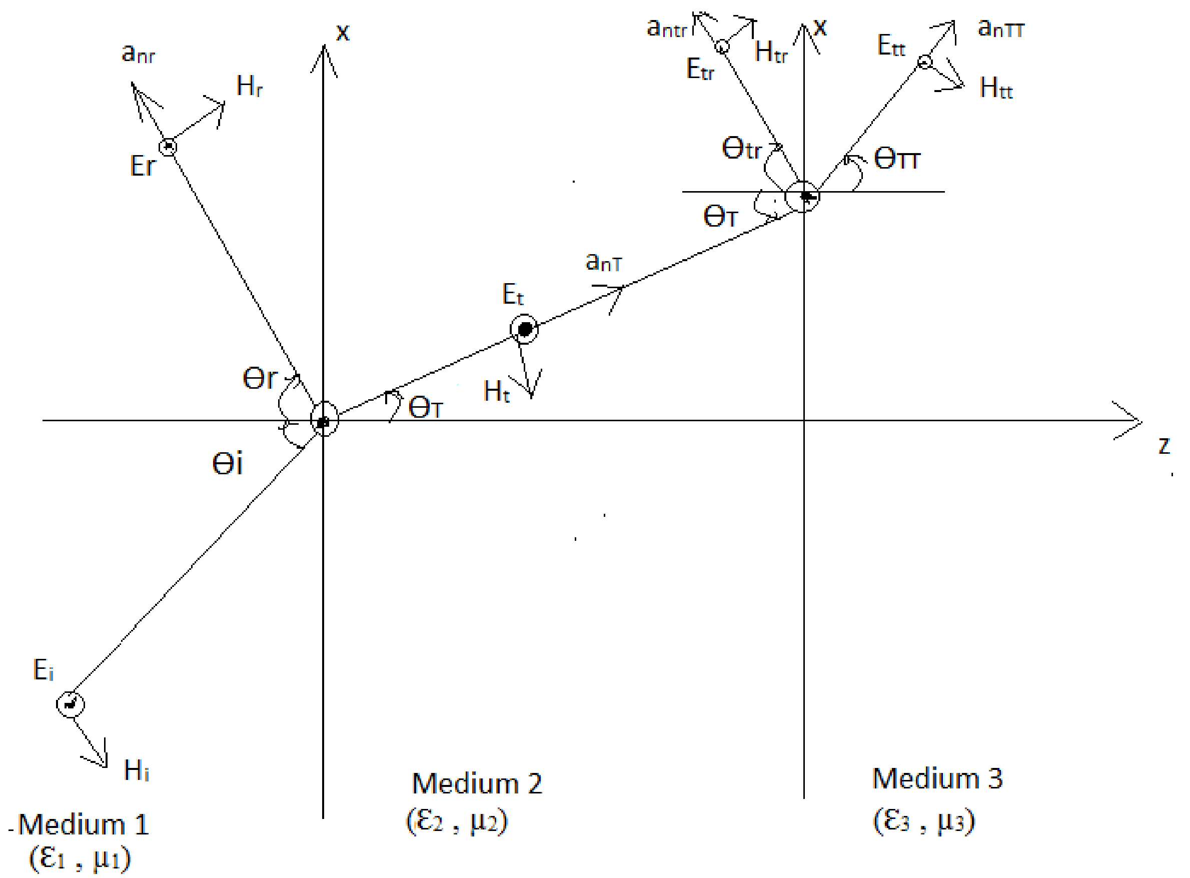


Figure 2-1 plane wave at oblique incidence across 2 dielectric boundaries (s-polarization)

$$\begin{pmatrix} E_{to} \\ \frac{E_{to}}{\eta_2}\cos\theta_t \end{pmatrix} = \begin{pmatrix} \cos\beta_Z d & j\frac{\eta_1}{\cos\theta}\sin\beta_Z d \\ j(\frac{\eta_1}{\cos\theta})^{-1}\sin\beta_Z d & \cos\beta_Z d \end{pmatrix}\begin{pmatrix} E_2 \\ H_2 \end{pmatrix} \quad \text{(2.1.30)}$$

The equations beginning from 2.1.1 to 2.1.29, that ultimately leads to equation 2.1.30 are derived in APPENDIX C [13, 14]. The equation 2.1.30 represents relationship between electric and magnetic field of the first layer with electric and magnetic field of the second layer via [A B; C D] transmission matrix. In the equation d = thickness of the layer, β_Z = wave number, $\beta_Z = \frac{2\pi}{\lambda}\tilde{n}\cos\theta$, θ = angle at which light ray is incident on the respective layer, λ = wavelength of light, varies from 5-14 µm, j = complex number, ñ = complex refractive index = n – ik where n = refractive index, k = extinction coefficient and i = complex number, $\eta_1 = optical\_impedance = \frac{377}{\tilde{n}}$.

2.2 p-polarization

In case of p-polarization, the incident electric field is parallel to the plane of incidence [12].

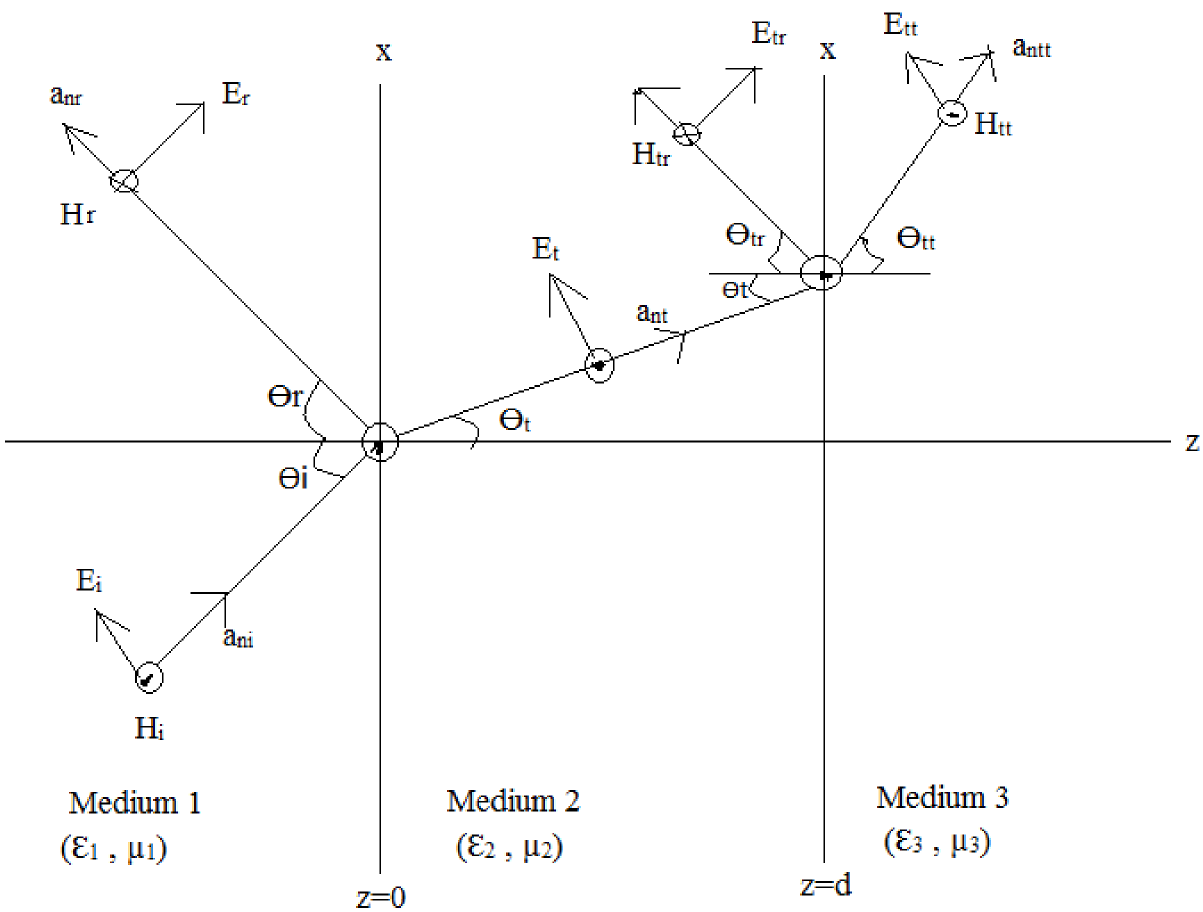


Figure 2-2 plane wave at oblique incidence across 2 dielectric boundaries (p-polarization)

$$\begin{pmatrix} E_{to} \\ \frac{E_{to}}{\eta_2}\cos\theta_t \end{pmatrix} = \begin{pmatrix} \cos\beta_Z d & j(\eta_1\cos\theta)\sin\beta_Z d \\ j(\eta_1\cos\theta)^{-1}\sin\beta_Z d & \cos\beta_Z d \end{pmatrix} \begin{pmatrix} E_2 \\ H_2 \end{pmatrix} \quad \text{..(2.2.30)}$$

The equations beginning from 2.2.1 to 2.2.29, that ultimately leads to equation 2.2.30 are derived in APPENDIX D [13, 14]. The equation 2.2.30 represents relationship between electric and magnetic field of the first layer with electric and magnetic field of the second layer via [A B; C D] transmission matrix. In the equation d = thickness of the layer, β_Z = wave number, $\beta_Z = \frac{2\pi}{\lambda}\tilde{n}\cos\theta$, θ = angle at which light ray is incident on the respective layer, λ = wavelength of light, varies from 5-14 µm, j = complex number, ñ = complex refractive index = n – ik where n = refractive index, k = extinction coefficient and i = complex number, $\eta_1 = optical\_impedance = \frac{377}{\tilde{n}}$.

2.3 Mathematical formulation for power calculations

Absorption and transmission losses can be reduced by transforming each of the layers of the sensor structure into transmission line matrix [5]. Such that each layer is represented by the characteristic

$\begin{pmatrix} A & B \\ C & D \end{pmatrix}$ matrix. The multiplication of $\begin{pmatrix} A & B \\ C & D \end{pmatrix}$ matrix of individual layers gives the total $\begin{pmatrix} A & B \\ C & D \end{pmatrix}$ matrix of the entire sensor structure. The situation here is analogous to the lumped circuit. The multiplication of the total $\begin{pmatrix} A & B \\ C & D \end{pmatrix}$ matrix with the 2*1 matrix of the electric and magnetic field of the mirror, gives the total electric and magnetic, of the respective sensor structure. In case of normal incidence, the electric field of mirror is 1 and magnetic field is 1/ŋ [5]. Here ŋ is the impedance of reflector. In case of oblique incidence the electrical field of mirror and magnetic field of the mirror are represented by the equations 2.27 and 2.28. The division of the total electric field of the sensor structure by the total magnetic field of the sensor structure gives the impedance that is denoted by the symbol 'Z' in the equation below [5]. The mathematical equations below also help in determining the total power that is partially absorbed (P_a) and partially reflected (Pr) by the sensor structure.

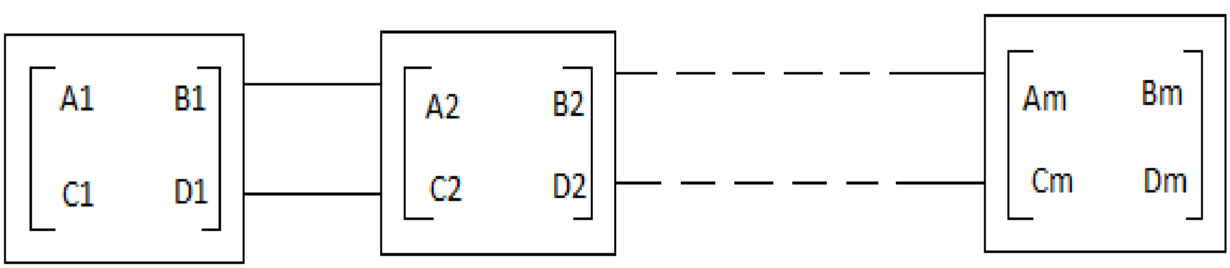


Figure 2-3 Two-port network

The electric and magnetic field of the first layer of sensor structure can be related to electric and magnetic field of the second layer of sensor structure using the following relationship:

$$\begin{pmatrix} E_1 \\ H_1 \end{pmatrix} = \begin{pmatrix} A_1 & B_1 \\ C_1 & D_1 \end{pmatrix} \begin{pmatrix} E_2 \\ H_2 \end{pmatrix} \tag{2.3.1}$$

In the above equation $\begin{pmatrix} A_1 & B_1 \\ C_1 & D_1 \end{pmatrix}$ is the characteristic transmission line matrix of the first layer of sensor structure

The electric and magnetic field of the second layer of sensor structure can be related to electric and magnetic field of the third layer of sensor structure using the following relationship:

$$\begin{pmatrix} E_2 \\ H_2 \end{pmatrix} = \begin{pmatrix} A_2 & B_2 \\ C_2 & D_2 \end{pmatrix} \begin{pmatrix} E_3 \\ H_3 \end{pmatrix} \tag{2.3.2}$$

In the above equation $\begin{pmatrix} A_2 & B_2 \\ C_2 & D_2 \end{pmatrix}$ is the characteristic transmission line matrix of the second layer of sensor structure

The electric and magnetic field of the first layer of sensor structure can be related to electric and magnetic field of the third layer of sensor structure using the following relationship

$$\begin{pmatrix} E_1 \\ H_1 \end{pmatrix} = \begin{pmatrix} A_1 & B_1 \\ C_1 & D_1 \end{pmatrix} \begin{pmatrix} A_2 & B_2 \\ C_2 & D_2 \end{pmatrix} \begin{pmatrix} E_3 \\ H_3 \end{pmatrix} \tag{2.3.3}$$

Assuming that there are 10 layers so,

$$M = M_1 * M_2 * ...... * M_{10} \tag{2.3.4}$$

$M_1, M_2, \ldots, M_{10}$ are the characteristic ABCD matrix of different layers of the sensor structure

$$\begin{pmatrix} E_1 \\ H_1 \end{pmatrix} = M \begin{pmatrix} E_{10} \\ H_{10} \end{pmatrix} \tag{2.3.5}$$

$$E_1 = 1 + r \tag{2.3.6}$$

In eqn. 2.6, r = reflection coefficient

$$H_1 = (1-r)Y_0 \quad (2.3.7)$$

$$M = \begin{pmatrix} m_{11} & m_{12} \\ m_{21} & m_{22} \end{pmatrix} \quad (2.3.8)$$

$$r = \frac{Y_0 m_{11} + Y_0 Y_S m_{12} - m_{21} - Y_S m_{22}}{Y_0 m_{11} + Y_0 Y_S m_{12} + m_{21} + Y_S m_{22}} \quad (2.3.9)$$

$$t = \frac{2Y_0}{Y_0 m_{11} + Y_0 Y_S m_{12} + m_{21} + Y_S m_{22}} \quad (2.3.10)$$

In eqn. 2.3.10, t = transmission coefficient [15]

In case of s-polarization [15],

$$Y_0 = \sqrt{\frac{\varepsilon_0}{\mu_0}} * n_0 * \cos\theta_0 \quad (2.3.11)$$

In case of p-polarization [15],

$$Y_0 = (\sqrt{\frac{\varepsilon_0}{\mu_0}} * n_0) / \cos\theta_0 \quad (2.3.12)$$

In case of s-polarization [15],

$$Y_S = \sqrt{\frac{\varepsilon_0}{\mu_0}} * n_{10} * \cos\theta_{10} \quad (2.3.13)$$

In case of p-polarization [15],

$$Y_s = (\sqrt{\frac{\varepsilon_0}{\mu_0}} * n_{10}) / \cos\theta_{10} \quad (2.3.14)$$

In equations 2.13 and 2.14, the sensor structure has been assumed of compromising of 10 layers hence refractive index and angle of incidence of the 10th layer has been considered.

Snell's law is used for ray tracing, to find θ of individual layers such that,

$$n_1 \sin\theta_1 = n_2 \sin\theta_2 \tag{2.3.15}$$

$$\begin{pmatrix} E_1 \\ H_1 \end{pmatrix} = \begin{pmatrix} \cos\beta_Z l & j\eta_1 \sin\beta_Z l \\ j\sin\beta_Z l \big/ \eta_1 & \cos\beta_Z l \end{pmatrix} \begin{pmatrix} E_2 \\ H_2 \end{pmatrix} \tag{2.3.16}$$

$$\beta_Z l = \beta l \cos\theta = \frac{2\pi}{\lambda} nl \cos\theta \tag{2.3.17}$$

λ= wavelength, n = refractive index of the individual layer, l = thickness of the individual layer, θ = angle of incidence of the individual layer

$$\eta_1 = \frac{\eta_0}{n_T} \tag{2.3.18}$$

η_0 = impedance of free space/vacuum $\approx$ 377

In case of p-polarization [13],

$$n_T = \frac{n}{\cos\theta} \tag{2.3.19}$$

In case of s-polarization [13],

$$n_T = n * \cos\theta \tag{2.3.20}$$

n = refractive index of the individual layer, θ = angle of incidence of the individual layer

$$Total = \begin{pmatrix} E_1 \\ H_1 \end{pmatrix} \tag{2.3.21}$$

$$Z = \frac{E_1}{H_1} \tag{2.3.22}$$

$$Rfw = \frac{Z - 377}{Z + 377} \tag{2.3.23}$$

$$realZ1 = real(Rfw) \tag{2.3.24}$$

$$imagZ1 = imag(Rfw) \tag{2.3.25}$$

$$\Pr = realZ1 * realZ1 + imagZ1 * imagZ1 \tag{2.3.26}$$

$$ElectricField_{mirror} = t \tag{2.3.27}$$

$$MagneticField_{mirror} = Y_S t \tag{2.3.28}$$

$$P_{mirror} = 0.5 * ElectricField_{mirror} * MagneticField_{mirror} \tag{2.3.29}$$

The incident electric field (E_i) in the sensor structure is determined by the following expression [5]

$$E_i = \frac{E_1}{1 + Rfw} \tag{2.3.30}$$

The incident magnetic field (H_i) in the sensor structure is determined by the following expression [5]

$$H_i = \frac{H_1}{\eta_0} \tag{2.3.31}$$

The incident power (P_i) [5] in the sensor structure is determined by the following expression

$$P_i = 0.5 * E_i * H_i \tag{2.3.32}$$

The transmitted power (P_t) [5] in the sensor structure is determined by the following expression

$$P_t = \frac{P_{mirror}}{P_i} \tag{2.3.33}$$

$$P_a = 1 - \Pr - P_t \tag{2.3.34}$$

2.4 Validation of the mathematical model

2.4.1 Matlab coding

Considering the calculation of the electric field and magnetic field of the sensor structure for wavelength of 14 µm for 1^0 angle of incidence on the first layer (optical filter → Germanium) of the sensor structure

Part of the Matlab code:

- EMFT1401 = EMF1(:,:,1,10)*EMF1(:,:,2,10)*EMF1(:,:,3,10)*EMF1(:,:,4,10)*EMF1(:,:,5,10)*EMF1(:,:,6,10)* EMF1(:,:,7,10)*EMF1(:,:,8,10)*EMF1(:,:,9,10)*EMF1(:,:,10,10) % *eqn 2.3.4*
- Ys = sqrt(E0./m0).*CRI11(11).*cos((Thetta1(1,10,1))*(pi/180)) % *eqn 2.3.13*
- Y0 = sqrt(E0./m0).*cos(1*(pi/180)) % *eqn 2.3.11*
- r1 = (Y0.*EMFT1401(1,1) + Y0.*Ys.*EMFT1401(1,2) - EMFT1401(2,1) - Ys.*EMFT1401(2,2))./(Y0.*EMFT1401(1,1) + Y0.*Ys.*EMFT1401(1,2) + EMFT1401(2,1) + Ys.*EMFT1401(2,2)) % *eqn 2.3.9*
- t1 = (2.*Y0)./(Y0.*EMFT1401(1,1) + Y0.*Ys.*EMFT1401(1,2) + EMFT1401(2,1) + Ys.*EMFT1401(2,2)) % *eqn 2.3.10*
- Yst1 = Ys.*t1 % *eqn 2.3.28*
- ell = 1 + r1 % *eqn 2.3.6*
- Mg1 = (1 - r1).*Y0 % *eqn 2.3.7*
- *% theoritically eqn 2.3.6 should be equal to Elec (below) and eqn 2.3.7 should be equal to Mag*
- Elec = EMFT1401(1,1).*t1 + EMFT1401(1,2).*Yst1
- Mag = EMFT1401(2,1).*t1 + EMFT1401(2,2).*Yst1

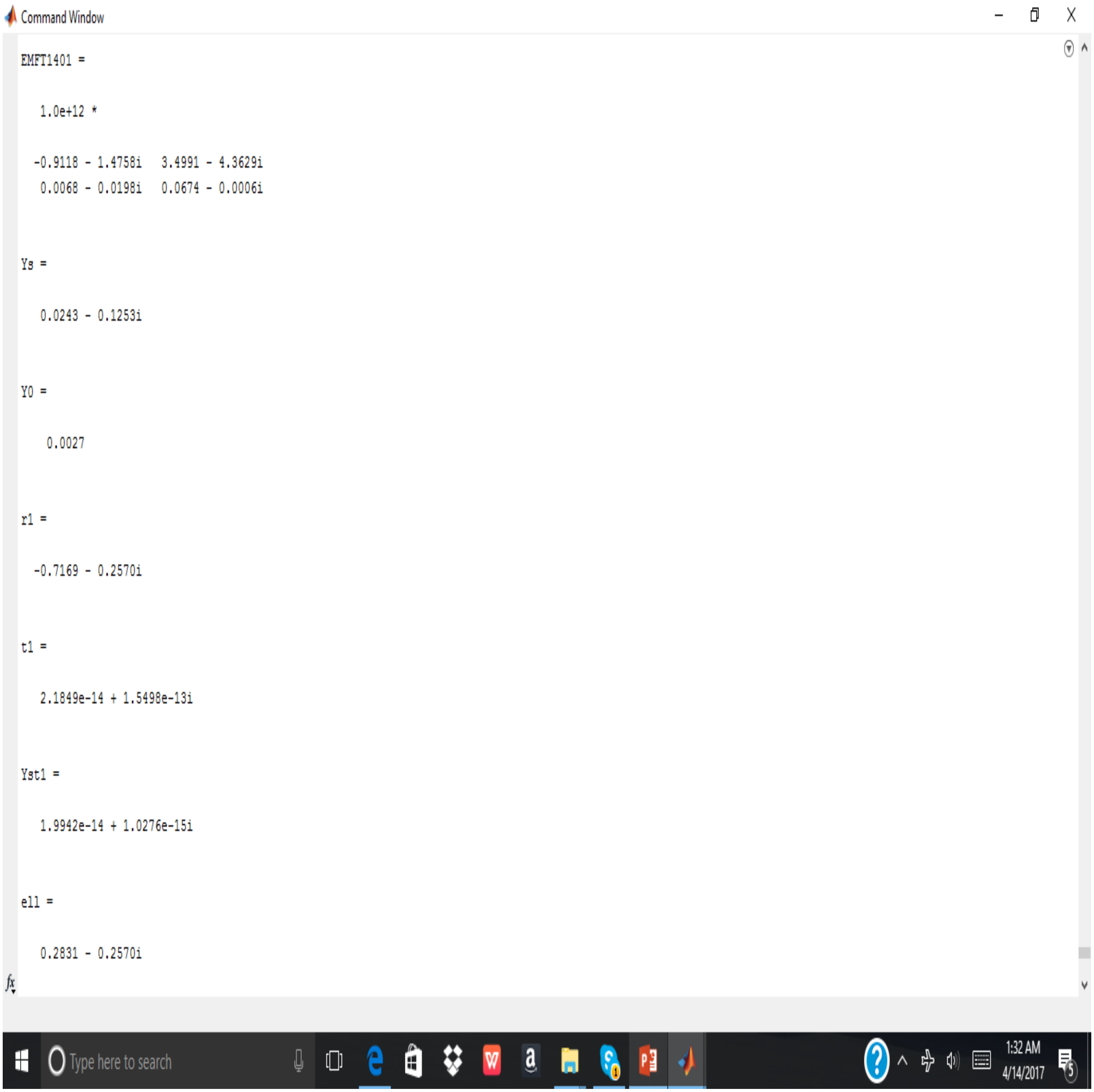


Figure 2-4 Command Window of the Matlab code

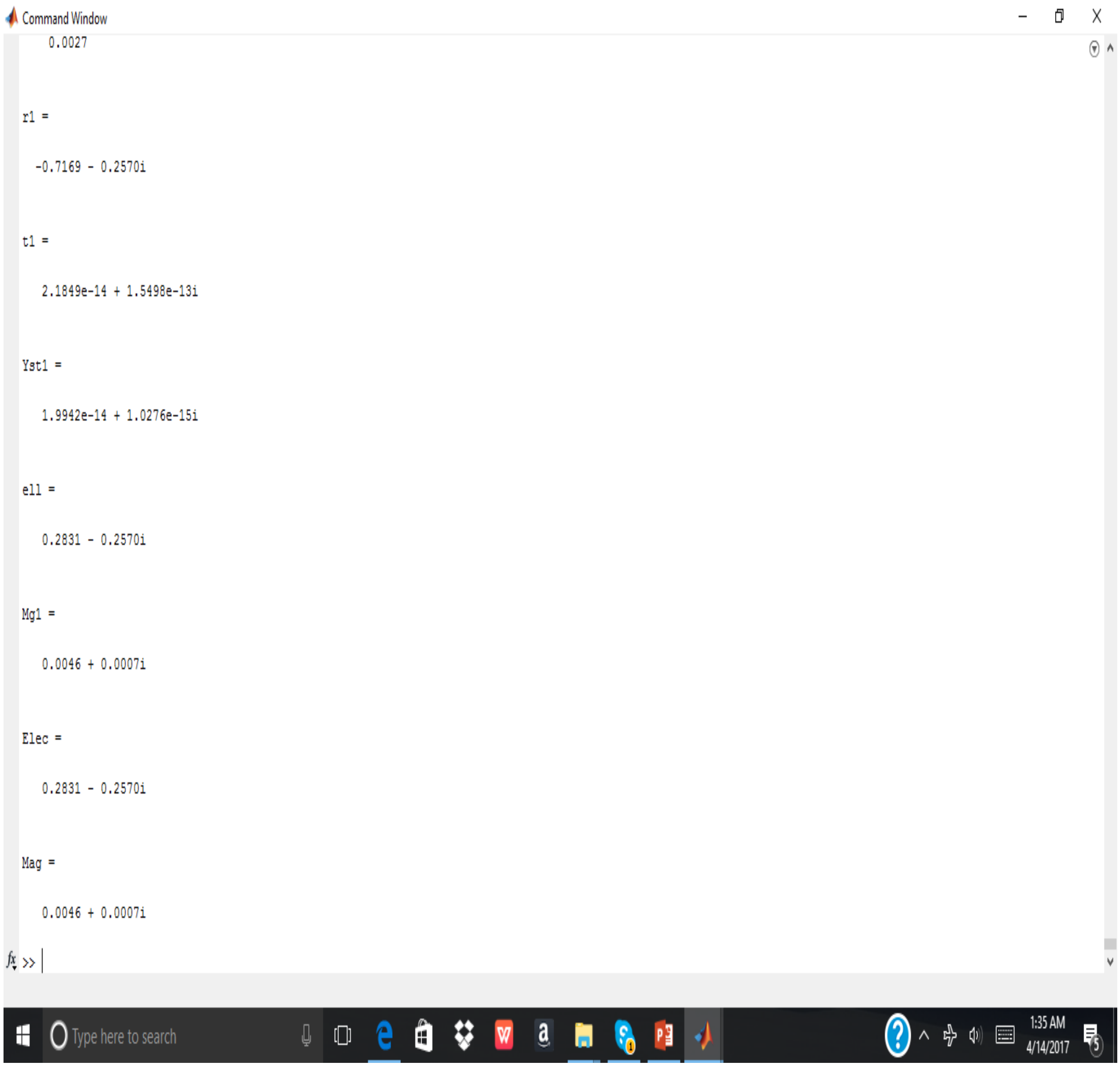


Figure 2-5 screenshot of the command window of the matlab code

In the above screenshot we see that theoretical assumptions (*eqn 2.3.5*) made previously are proved correct. We can safely conclude that the L.H.S (*eqn 2.3.5*) is equal to R.H.S (*eqn 2.3.5*).

2.4.2 Analytical Approach

For normal incidence

RP0 = [0.9285 0.8464 0.9339 0.8738 0.9668 0.9521 0.7168 0.7490 0.6146 0.5802]

For s-polarization

RP1 = [0.9287 0.8465 0.9338 0.8741 0.9668 0.9521 0.7167 0.7490 0.6145 0.5801]

For p-polarization

RP1 = [0.9287 0.8465 0.9338 0.8740 0.9668 0.9520 0.7168 0.7490 0.6145 0.5801]

In RP0. RP represents the reflected power. The 0 represents the angle at which the light ray is incident on the sensor structure. Likewise, in RP1, the 1 represents the 1^0 angle, at which the light ray is incident on the first layer (Germanium) of the sensor structure (I). The 10 values in the array represent the magnitude of reflected power from a wavelength range of 5 – 14 µm, for all the cases.

We see that the values obtained in normal incidence and oblique incidence for a value of 1 degree angle, at which the light ray in incident on the sensor structure are having almost the same values with minor deviations. The minor deviations are due to the cosine angle getting multiplied or getting divided, in case of the s and p polarizations, of the [A B; C D] transmission matrix.

2.5 Conclusion

Thus, in this chapter we derived the [A B; C D] transmission matrix for both the s and p polarizations. We derived the expressions to determine the maximum power absorbed and reflected in a sensor structure by using the [A B; C D] matrix. We examined the validity of the mathematical model by simulating it in matlab and doing analytical comparison of the values obtained for 1^0 of incident light for s and p polarizations with the normal incidence of light on sensor structure I, having Ge as optical filter.

CHAPTER THREE

DESCRIPTIONS OF SENSORS USED IN SIMULATION

3.1 Sensor Structure I

Ahmed et al. [5] suggested a sensor structure which included an Al mirror, that reflects ≈ 99.44% IR in wavelength range of 11.4 µm. To increase the isolation of sensing material from the Si substrate vacuum layer was incorporated above the mirror. A membrane material that was strong enough to withstand the sensing material and structures above and below it was involved. Alumina having a low thermal conductivity and high young's modulus was used as the membrane material. The incorporation of top and bottom electrode with the sensing material gave an absorption of 70% without reflector and packaging layer. The sandwich structure was the cause of constructive and destructive interference, such that a change of sensing material would not affect the performance of the microbolometer. For the top and bottom electrode Al was used. Si was used as sensing material, as it remains robust, is easy to deposit and works well below 250^0 C. The encapsulation layer above the top electrode, helps in deposition of extra sacrificial layer between the encapsulation layer and sensing material. Alumina was used in the encapsulation layer. The packaging layer helps to reduce the heat loss by convection, in order device packaging in vacuum also helps in protection by external forces. The packaging layer also helped in closing the windows of the encapsulation layer. The optical filter facilitates the microbolometer in behaving in much more thermal centric manner as it absorbs and reduces the photo-generated carriers from affecting the device performance. Ge was used as optical filter as it's extinction coefficient is 0 from 5 to 13 µm. In addition, Ge blocks the UV, VIS radiation allowing only IR upwards from 2 µm to pass through it. A Monte-Carlo with simulated thermal annealing was used to determine the thickness of the sensor layers, for an optimized performance.

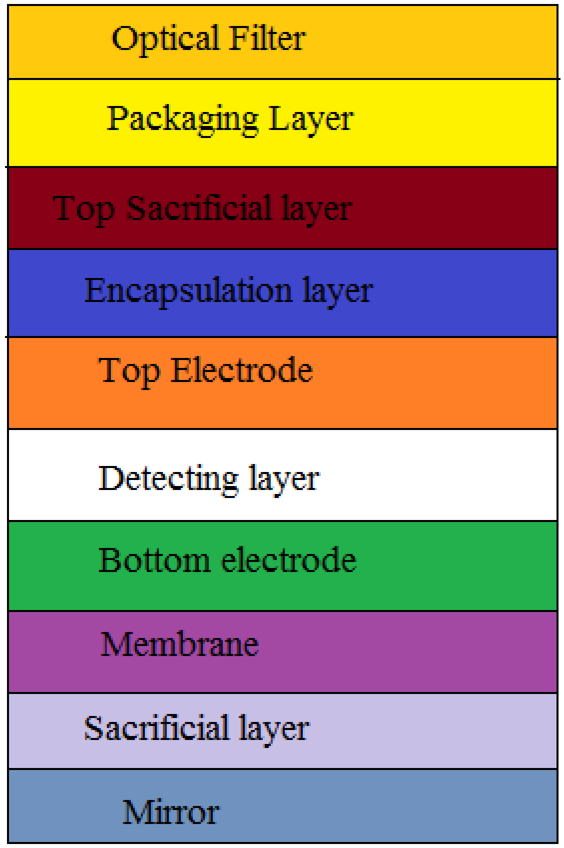


Figure 3-1 Sensor structure proposed by Ahmed et. al. [5]

Sensor layer	Material	Thickness (nm)
Optical Filter	Germanium (Ge)	720
Packaging layer	Alumina (Al_2O_3)	2500
Top Sacrificial layer	Vacuum	3700
Encapsulation layer	Alumina (Al_2O_3)	100
Top Electrode	Aluminum (Al)	30
Detecting material	Silicon (Si)	500
Bottom Electrode	Aluminum (Al)	30
Membrane	Alumina (Al_2O_3)	100
Sacrificial layer	Vacuum	3200

Mirror	Aluminum (Al)	300

Table 3-1 Different sensor layer thickness proposed by Ahmed et. al. [5]

3.2 Sensor structure 1

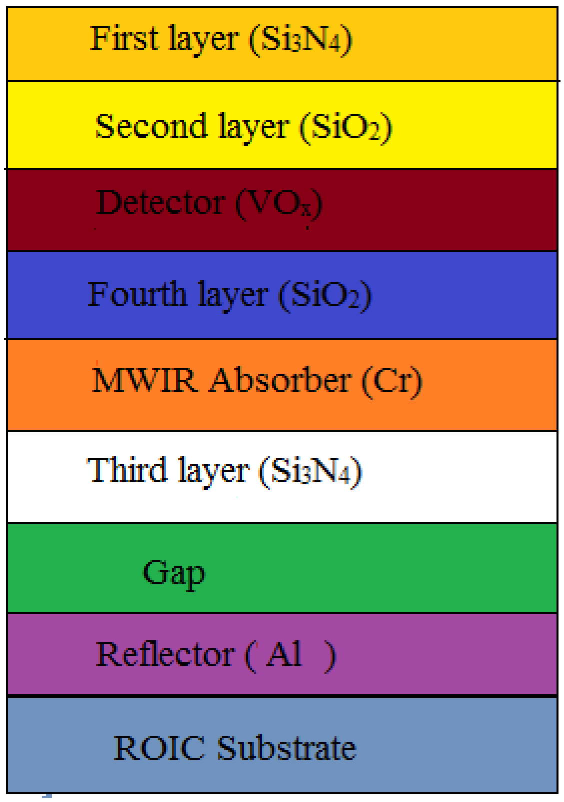


Figure 3-2 Sensor structure proposed by Geneczko et. al. [16]

The detector of the microbolometer structure suggested by Jeannie Geneczko et. al. [16] in their patent is supported structurally by the usage of Silicon nitride (Si_3N_4) and Silicon dioxide (SiO_2) in the first and second layers. The first layer of Si_3N_4 in the above structure also serves as the pathway for electrical passivation, providing electrical contacts to the detector. The second layer SiO_2 on the other hand helps in fabrication process, provides isolation of the detector, not interfering with its sensitivity. The third layer, VO_x is used as the detecting material since it has a high TCR. A higher TCR provides better sensitivity. The fourth layer SiO_2 provide structural protection, support, connectivity, detector isolation and attachments with the other layers. The fifth layer is MWIR absorber. Cr, TiN, TiW are the materials suggested in the patent to be used as MWIR absorber however for the present sensor structure, Chrome (Cr) has been used. The sixth layer of Si_3N_4 is used for structural purposes. The seventh layer of Gap (vacuum) provides isolation of the detector from the ROIC substrate. The thickness of the Gap is almost one-fourth of the wavelength, used for the characterization of the detector. For eighth layer is the reflector layer. Different metals such as TiW, Al, can be used for the reflector layer. For the simulation purposes we are using Al as the reflector layer. The microbolometer has been designed to detect two/three colors in the pixels. The combinations of SWIR/MWIR, MWIR/LWIR, SWIR/MWIR/LWIR are some of the possibilities. For simulations purpose of this thesis, the combination MWIR/LWIR with the related thickness of the various sensor layers has been used to determine the results of the simulation for s and p polarization.

Sensor Layer	Material	Thickness
First Layer	Silicon Nitride (Si_3N_4)	0.33 µm
Second Layer	Silicon Dioxide (SiO_2)	0.03 µm
Third Layer	Vanadium Oxide (VO_x)	0.12 µm
Fourth Layer	Silicon Dioxide (SiO_2)	0.05 µm
Fifth Layer	Chrome (Cr)	0.0075 µm
Sixth Layer	Silicon Nitride (Si_3N_4)	0.1 µm
Seventh Layer	Vacuum	1.3 µm
Eighth Layer	Aluminum (Al)	0.1 µm

Table 3-2 Different sensor layer thickness proposed by Geneczko et. al. [16]

3.3 Sensor Structure 2

Figure 3-3 Sensor structure proposed by Awad et al. [17]

This microbolometer structure suggested by Awad et al. [17] comprises of dual sensing materials of Ti and V_2O_5. Silicon Nitride (Si_3N_4), which forms the first, third and fifth layer of the sensor structure acts as the LWIR absorption layers, also providing structural support and isolation to the sensing materials. The Air-Gap which forms the sixth layer, is used to provide thermal isolation of the sensing material from the Si substrate. The thickness of the optical cavity (air-gap) is chosen in a manner to enhance the absorption, back and forth across the sensor layers, and increase the performance of the microbolometer. Simulations results conducted show that Au has maximum reflectivity when compared to Al and Ag. Therefore, Au is as reflector material in the sensor structure. Titanium promotes the sticking of the mirror with the SiO_2, which in-turn acts as the passivation layer. The thickness of the various sensor layers was optimized and determined using the Essential-Macleod package. The package is a tool that is used for designing the sensor structures.

Sensor Layer	Material	Thickness
First Layer	Silicon Nitride (Si_3N_4)	300 nm
Second Layer	Titanium (Ti)	5 nm
Third Layer	Silicon Nitride (Si_3N_4)	300 nm
Fourth Layer	Vanadium Pentaoxide (V_2O_5)	150 nm
Fifth Layer	Silicon Nitride (Si_3N_4)	300 nm
Sixth Layer	Vacuum	3500 nm
Seventh Layer	Gold (Au)	120 nm
Eighth Layer	Titanium (Ti)	10 nm
Ninth layer	Silicon Dioxide (SiO_2)	300 nm
Tenth layer	Silicon Substrate (Si)	infinity

Table 3-3 Different sensor layer thickness proposed by Awad et. al. [17]

3.4 Sensor Structure 3

Cheng et. al. [18] proposed a sensor structure that uses the chromogenic properties of Vanadium Oxide (VO_2). Whereby in their dual band microbolometer for wavelength range of 8-9.4 µm the VO_2 is used as a mirror, by heating it to 68^0 C and from 9.4-10.8 µm it behaves like a semiconductor, by cooling it to room temperature. As it behaves like a semiconductor it allows the IR radiation to pass through it, where after passing through the spacer layer (SiO_2), it is reflected by Au mirror. The wavelength range of 9.4-10.8 µm, this increases the optical cavity of the sensor structure, increasing the absorbance. The first layer of sensor structure consists of SiO_2, which deposited over Si substrate acts as the insulating layer. The second layer comprises of Cr, which acts as the adhesion material between the insulating layer and Au mirror, situated over it. Above the Au mirror, lies the SiO_2 which acts as spacer layer between VO_2 and Au. Above SiO_2 lies the VO_2. There is an air gap above the VO_2, the spacing of the air gap is varied to measure the absorbance of sensor structure over range of different wavelengths in LWIR. The air gap in a way isolates the microbolometer sensing material from the substrate. Ti electrode is deposited over the air gap as it has lesser thermal conductivity than Au. Normally a material say a polyimide is deposited over VO_2 and over the polyimide the Ti electrode is deposited, followed by the etching of the polyimide, to create an air gap. Au deposited over Ti, helps in supporting the Ti electrode arm structure. A sandwich structure of Si_3N_4-VO_x-Si_3N_4 are sensor layers over the Au. The layer of Si_3N_4 over Au acts like a bridge in the microbolometer structure. The VO_x is an IR sensing material. The layer of Si_3N_4 over VO_x helps in preventing the electrical contact between VO_x and the Ti absorber, that is deposited over the Si_3N_4. Above the Ti absorber lies another Si_3N_4 sensor layer, which aids in its protection. The schematic diagram of the described sensor structure is provided below. The thickness of the various materials used in the sensor layers was optimized from the electromechanical model results and the FEM analysis done in CoventorWare, by the authors of the paper. The dual-band sensor structure was simulated and fabricated keeping in mind the LWIR, instead of both MWIR and LWIR, as MWIR is not very effective of operating in the surveillance systems.

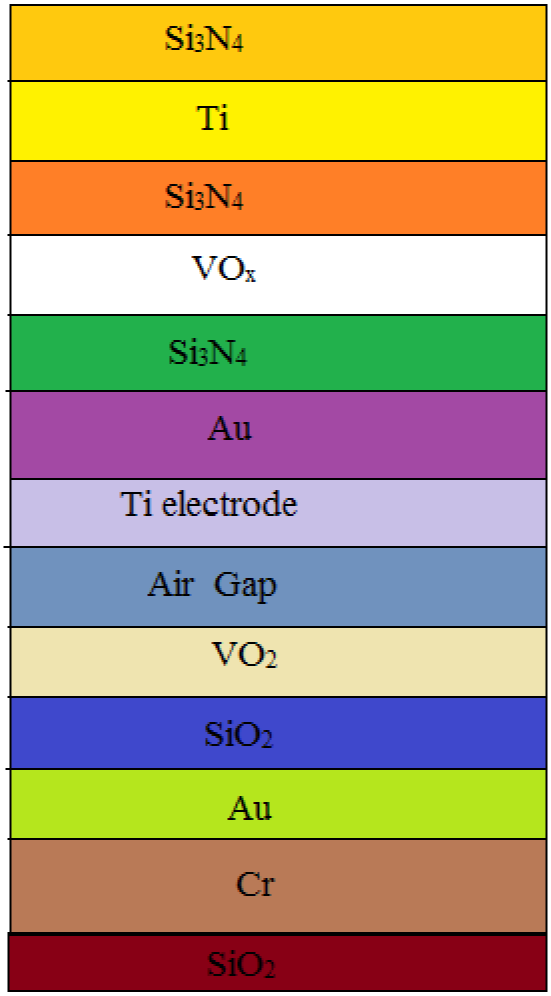


Figure 3-4 Sensor structure proposed by Cheng et. al. [18]

Sensor Layer	Material	Thickness
First Layer	Silicon Nitride (Si_3N_4)	50 nm
Second Layer	Titanium (Ti)	10 nm
Third Layer	Silicon Nitride (Si_3N_4)	50 nm
Fourth Layer	Vanadium Oxide (VO_x)	150 nm
Fifth Layer	Silicon Nitride (Si_3N_4)	400 nm
Sixth Layer	Gold (Au)	100 nm
Seventh Layer	Ti electrode	100 nm

Eighth Layer	Air Gap	3.9 µm
Ninth layer	Vanadium dioxide (VO_2)	130 nm
Tenth layer	Silicon Dioxide (SiO_2)	600 nm
Eleventh layer	Gold (Au)	200 nm
Twelfth layer	Chromium (Cr)	150 nm
Thirteenth layer	Silicon Dioxide (SiO_2)	200 nm

Table 3-4 Different sensor layer thickness proposed by Cheng et. al. [18]

3.5 Sensor Structure 4

In the design of the reflector that is to be fitted by Wang et. al. [19] in a microbolometer a lesser reflectivity of the top mirror is desired when compared to the bottom mirror. Cr and Ge are the two materials that are used in conjunction, for the top mirror. Au with reflectivity of near about 100% is used as the bottom mirror. The distributed bragg reflector pair of Ge-ZnS further enhance the optical properties of the reflector structure, by enhancing the reflectivity. Ge-ZnS also help in easing the manufacturing of the reflector. The reflector structure is illustrated below. An increase in thickness of the top mirror, increases the response time of the microbolometer. The thickness of filter layers keeping these design considerations in mind has led to values as given in the table below.

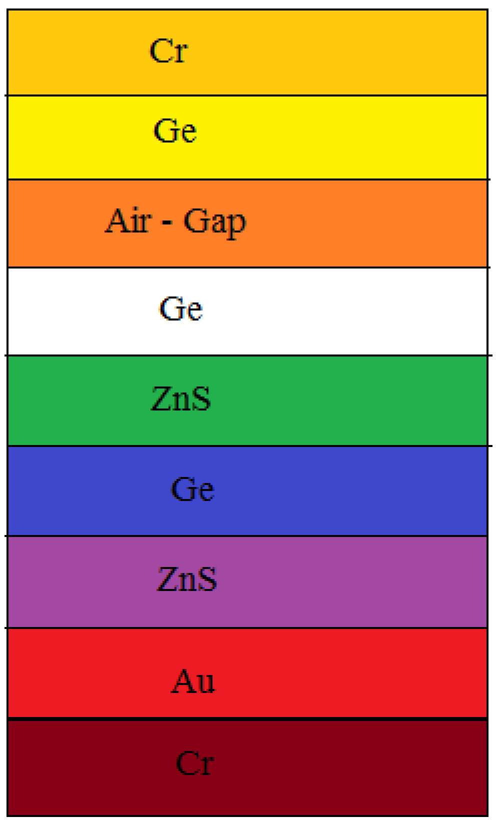


Figure 3-5 Filter structure proposed by Wang et. al. [19]

Filter Layer	Material	Thickness
First Layer	Chromium (Cr)	18 Å
Second Layer	Germanium (Ge)	0.6 µm
Third Layer	Air Gap	4.5 µm
Fourth Layer	Germanium (Ge)	0.1175 µm
Fifth Layer	Zinc Sulphide (ZnS)	0.5443 µm
Sixth Layer	Germanium (Ge)	0.2242 µm
Seventh Layer	Zinc Sulphide (ZnS)	0.5152 µm
Eighth Layer	Gold (Au)	0.6 µm
Ninth Layer	Chromium (Cr)	300 Å

Table 3-5 Different filter layer thickness proposed by Wang et. al. [19]

3.6 Conclusion

Thus, in this chapter we studied the material properties of different sensor structures. Along with the novelties of the different structures the schematics and thickness values of the various thin film sensor layers was put together in tabular format.

CHAPTER FOUR

RESULTS AND COMPARATIVE STUDY

4.1 Results for Sensor Structure I

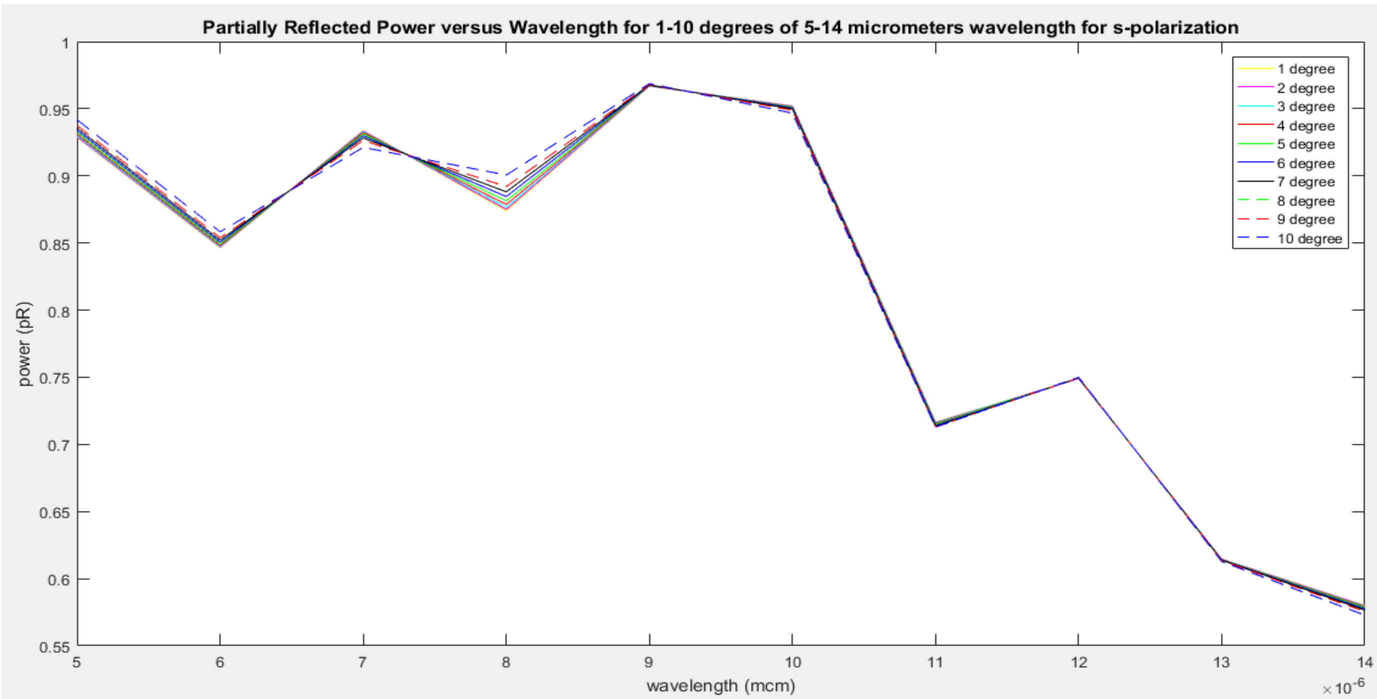


Figure 4-1-1 Partial Reflected Power versus 5-14 μm wavelength for 1-10 degrees for s-polarization

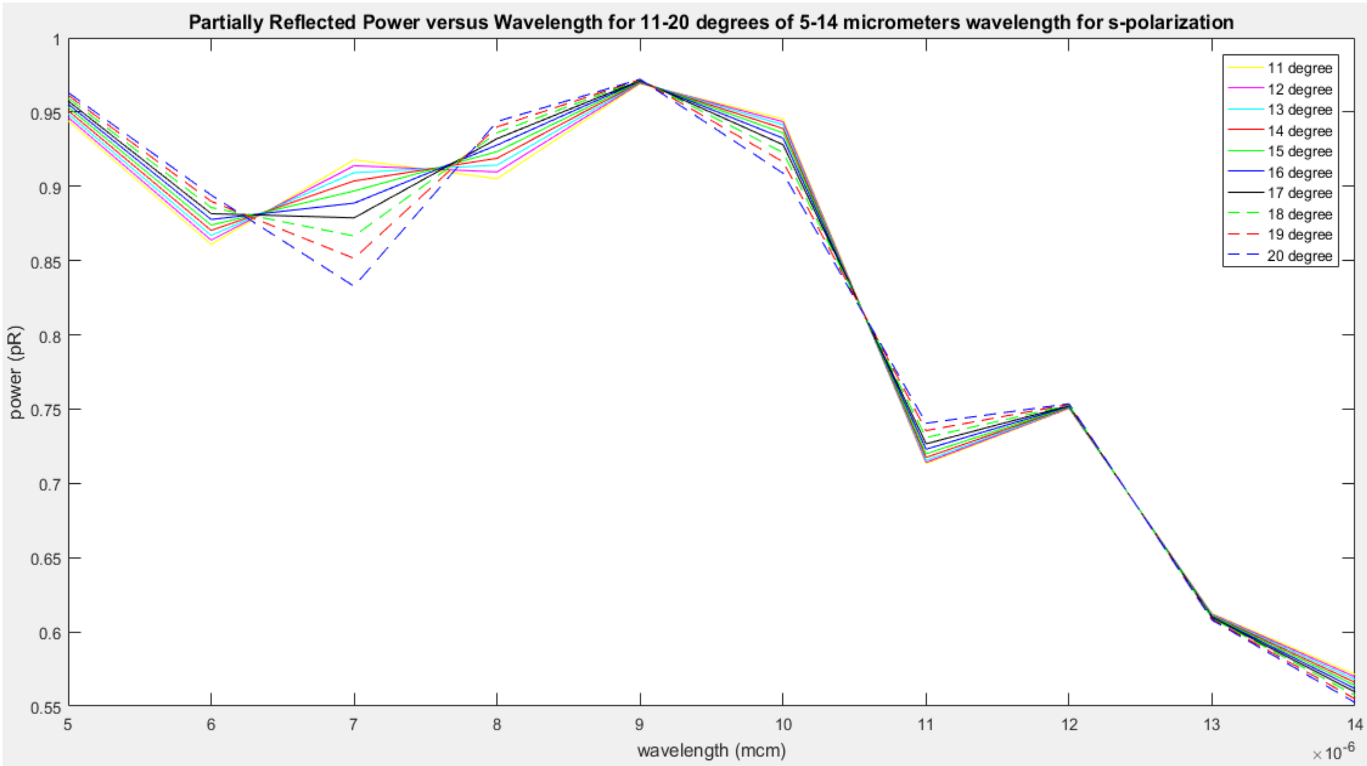


Figure 4-1-2 Partial Reflected Power versus 5-14 μm wavelength for 11-20 degrees of s-polarization

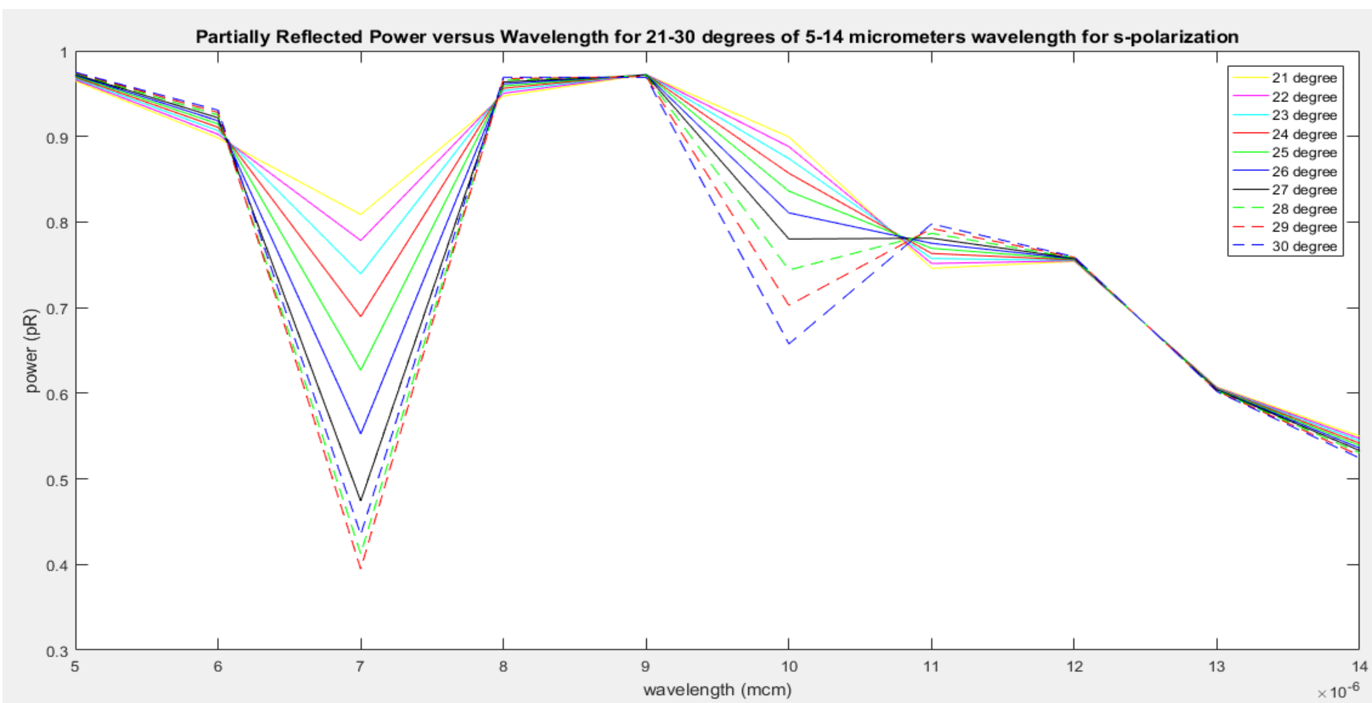


Figure 4-1-3 Partial Reflected Power versus 5-14 μm wavelength for 21-30 degrees of s-polarization

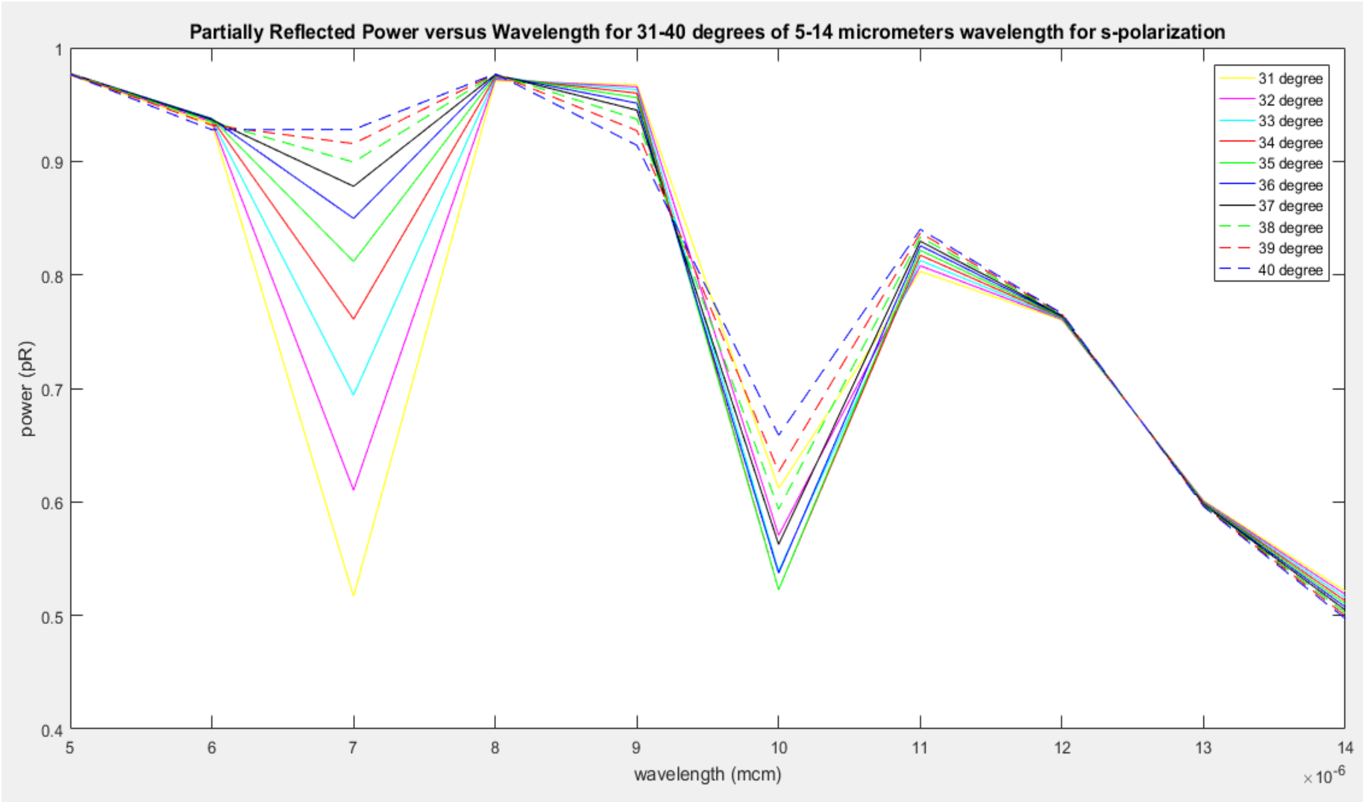


Figure 4-1-4 Partial Reflected Power versus 5-14 µm wavelength for 31-40 degrees of s-polarization

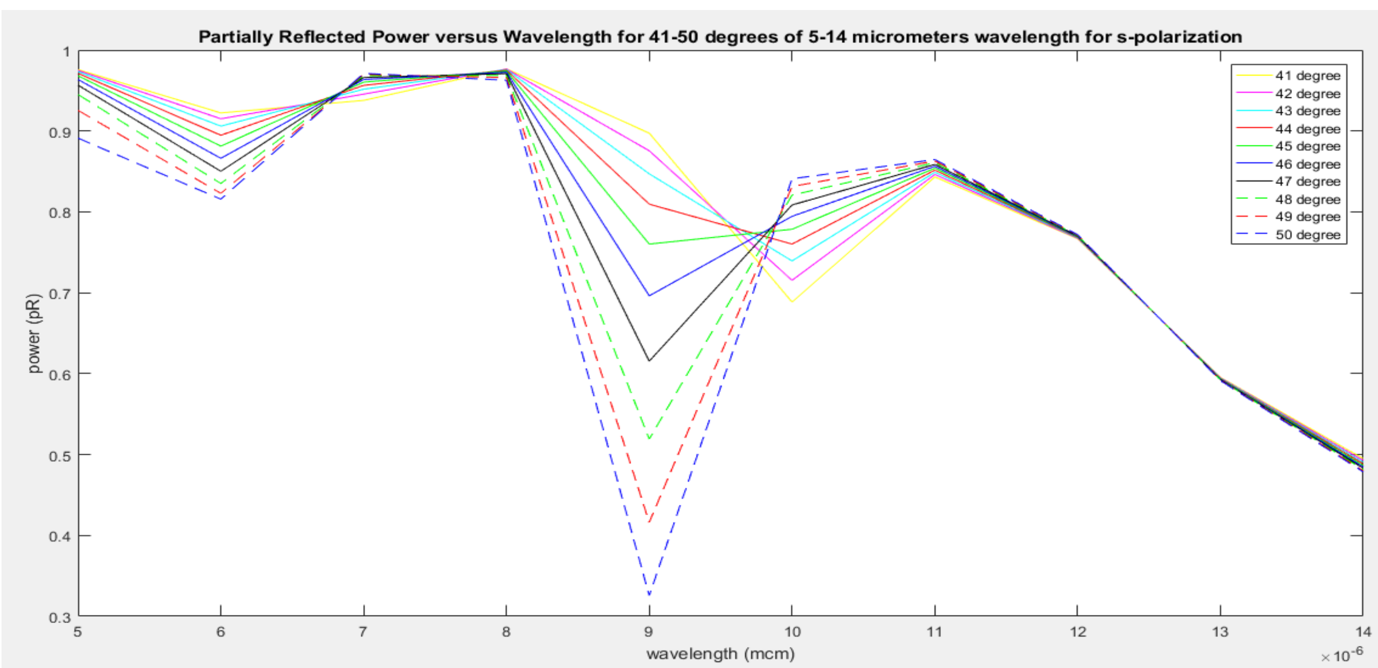


Figure 4-1-5 Partial Reflected Power versus 5-14 µm wavelength for 41-50 degrees of s-polarization

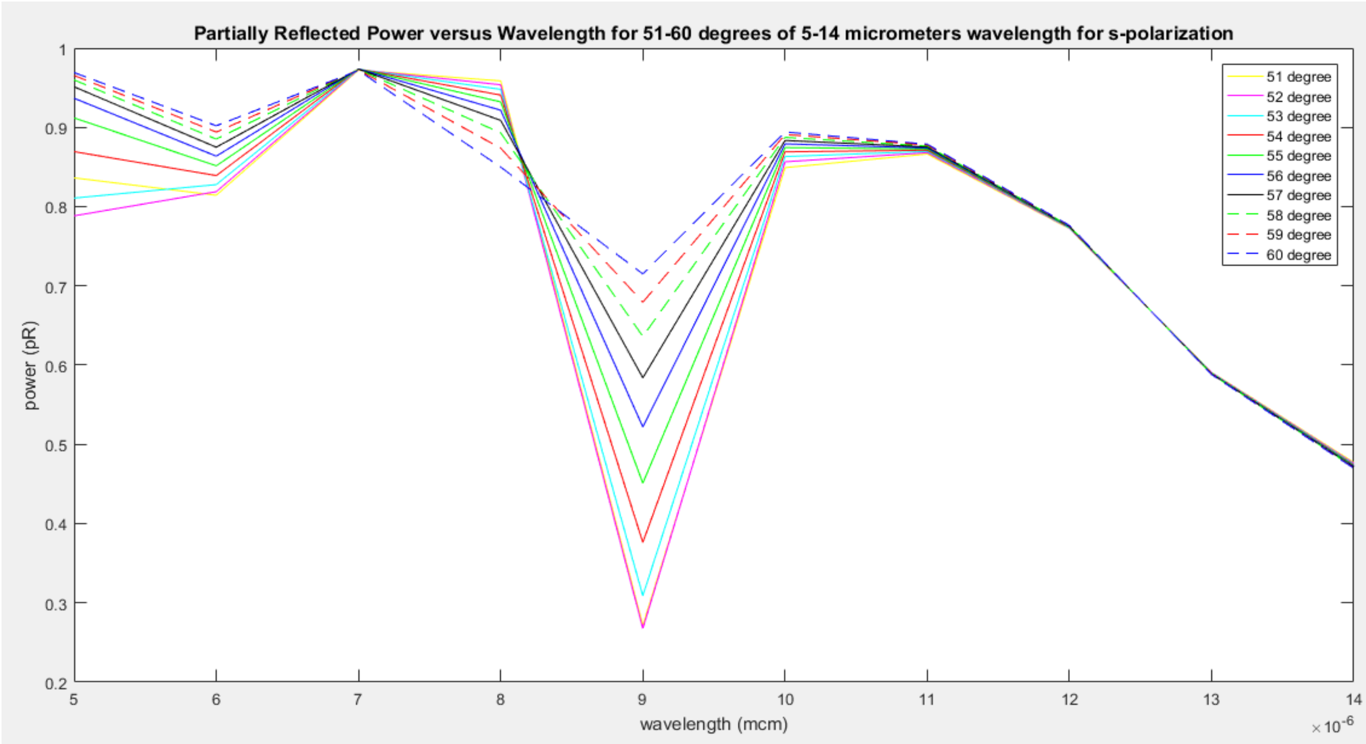


Figure 4-1-6 Partial Reflected Power versus 5-14 µm wavelength for 51-60 degrees of s-polarization

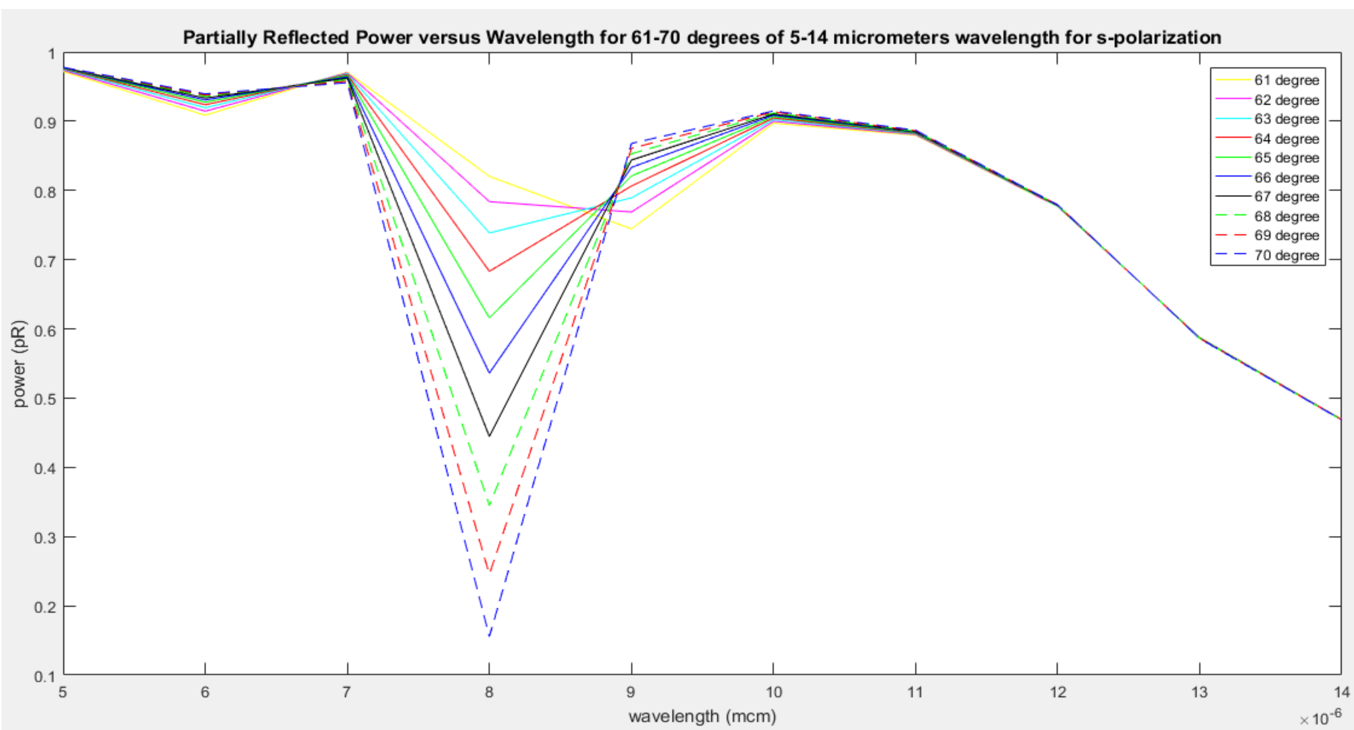


Figure 4-1-7 Partial Reflected Power versus 5-14 µm wavelength for 61-70 degrees of s-polarization

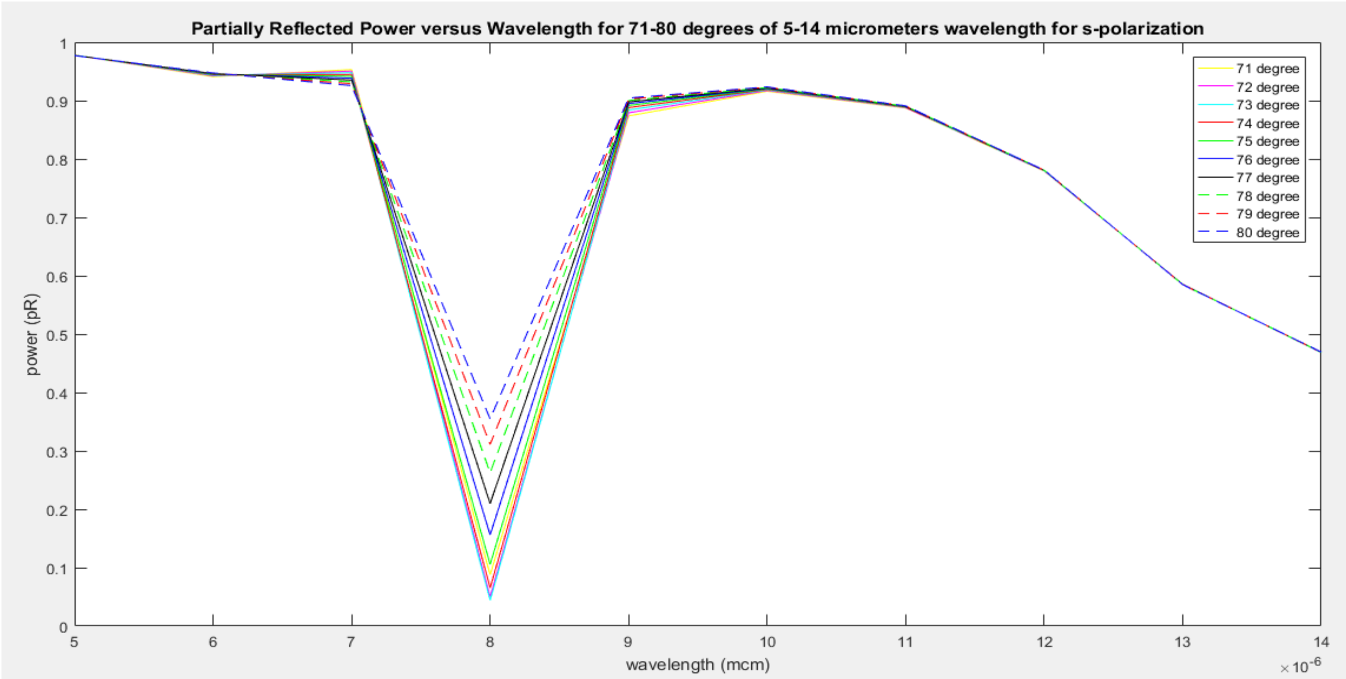


Figure 4-1-8 Partial Reflected Power versus 5-14 µm wavelength for 71-80 degrees of s-polarization

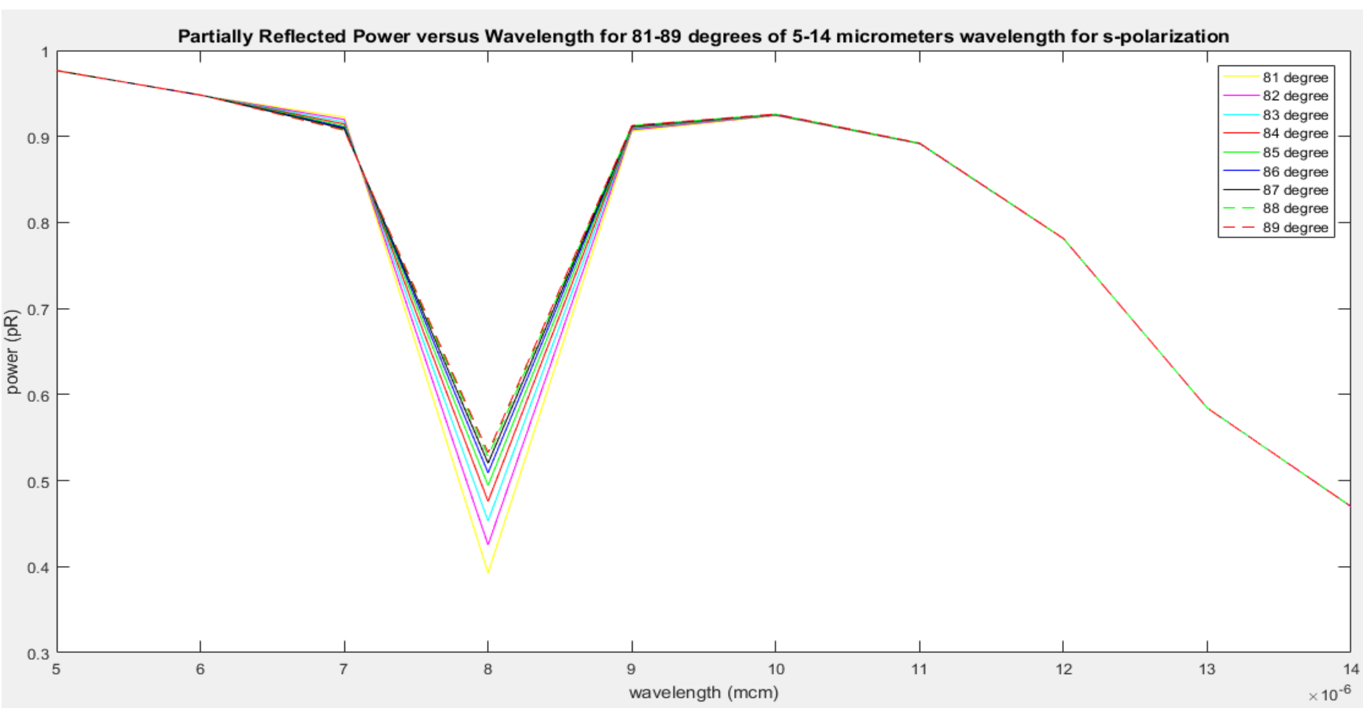


Figure 4-1-9 Partial Reflected Power versus 5-14 µm wavelength for 81-89 degrees of s-polarization

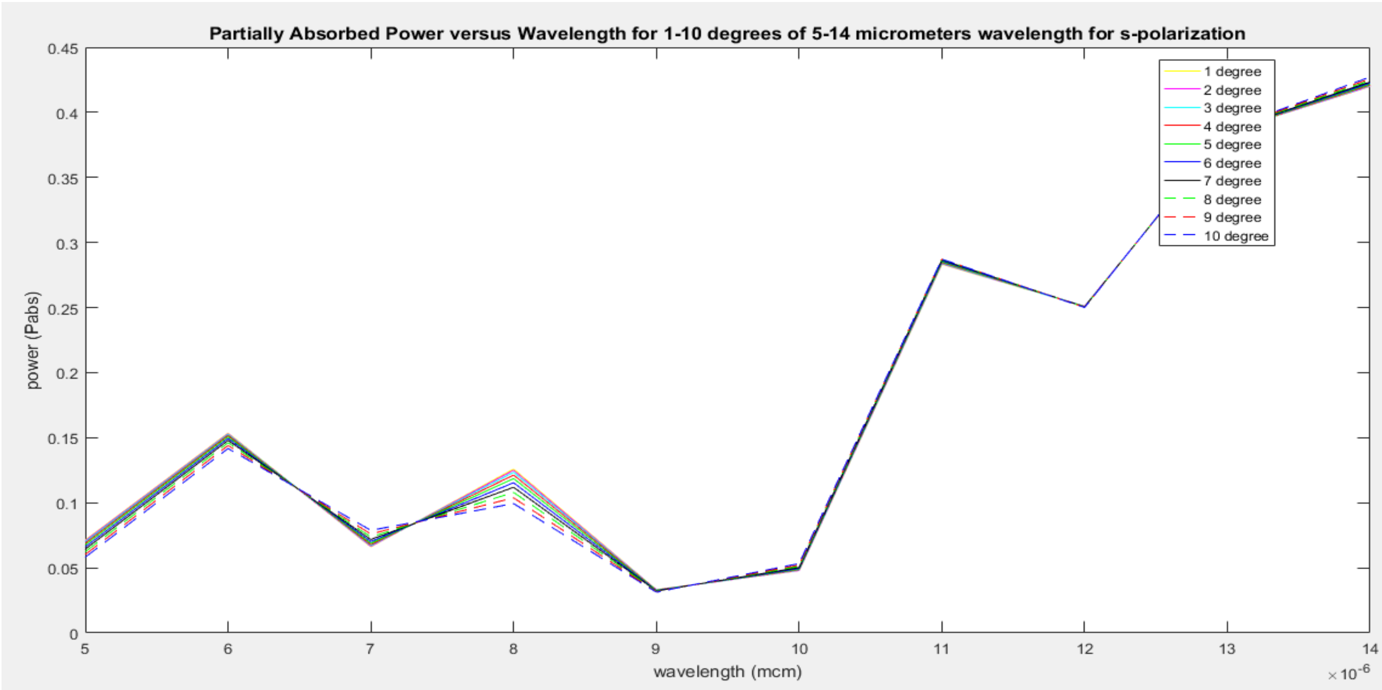


Figure 4-1-10 Partial Absorbed Power versus 5-14 µm wavelength for 1-10 degrees of s-polarization

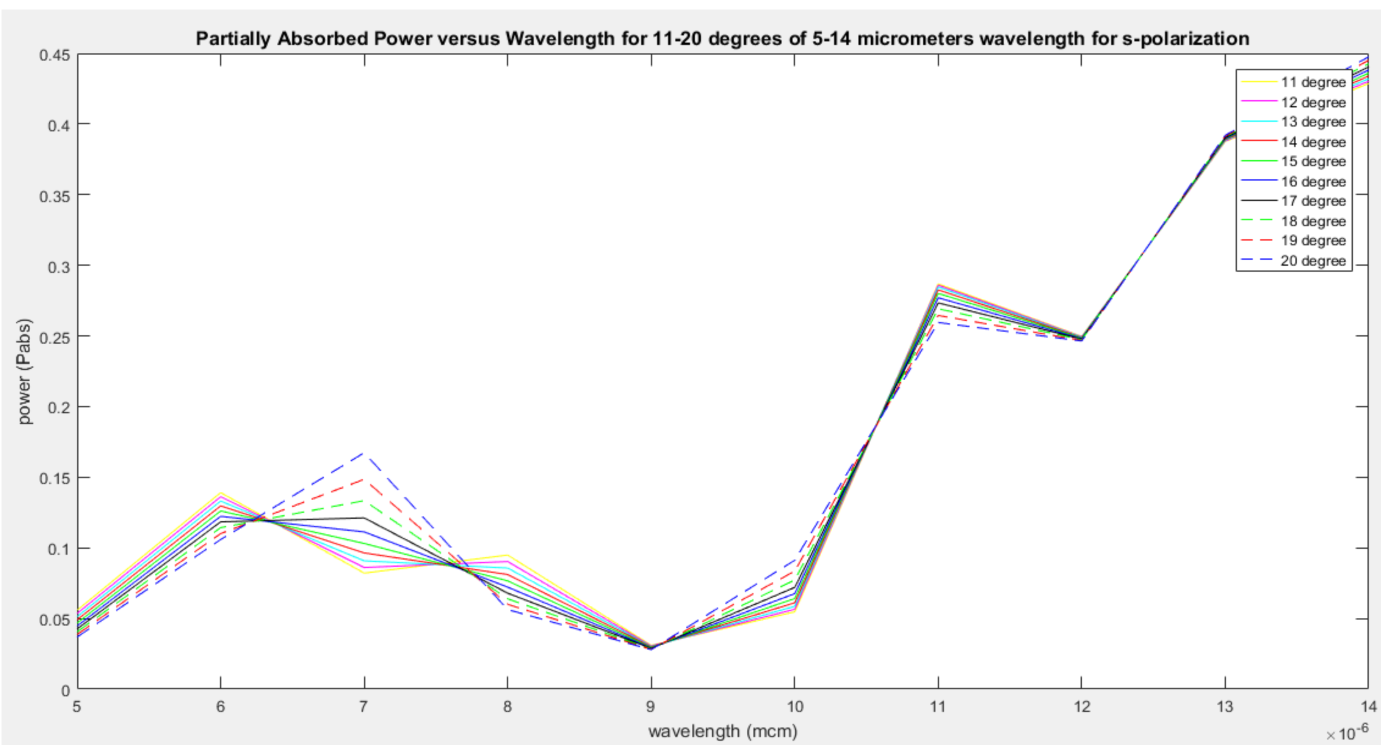


Figure 4-1-11 Partial Absorbed Power versus 5-14 µm wavelength for 11-20 degrees of s-polarization

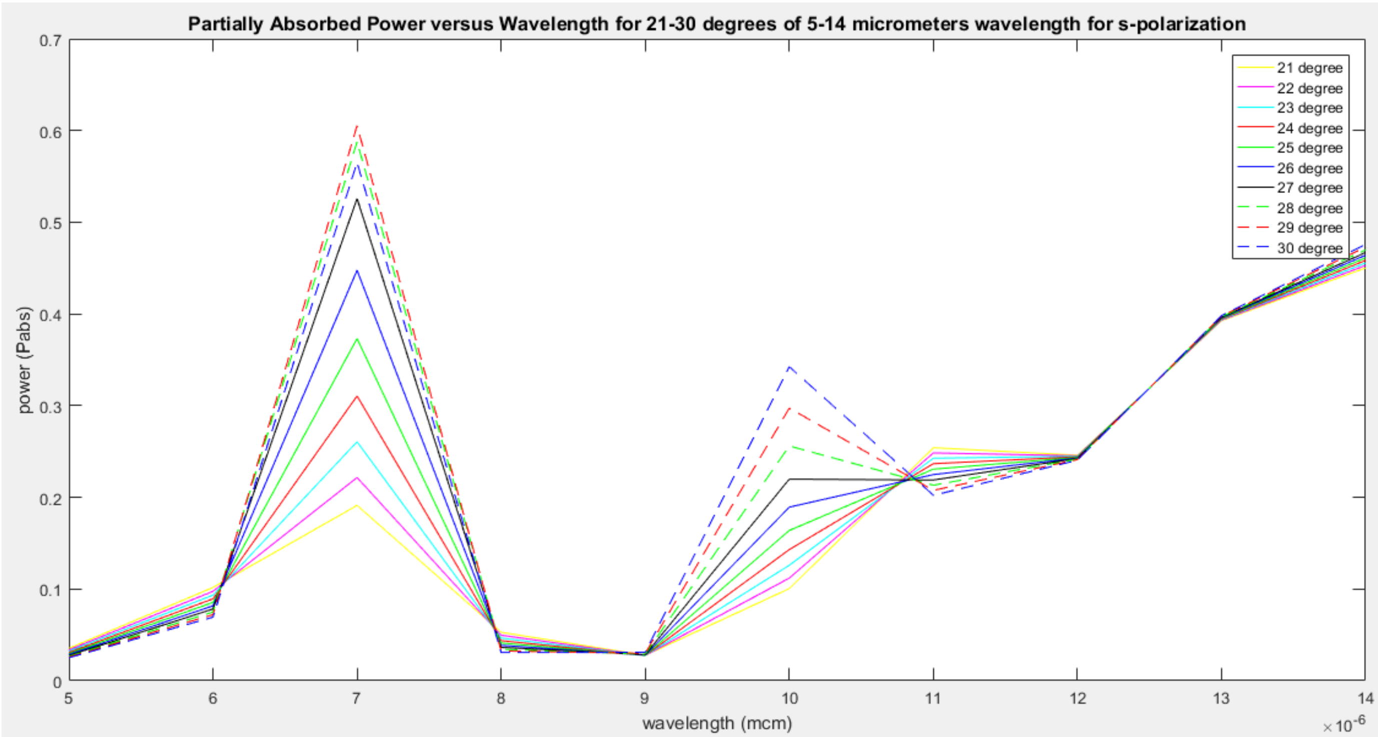


Figure 4-1-12 Partial Absorbed Power versus 5-14 μm wavelength for 21-30 degrees of s-polarization

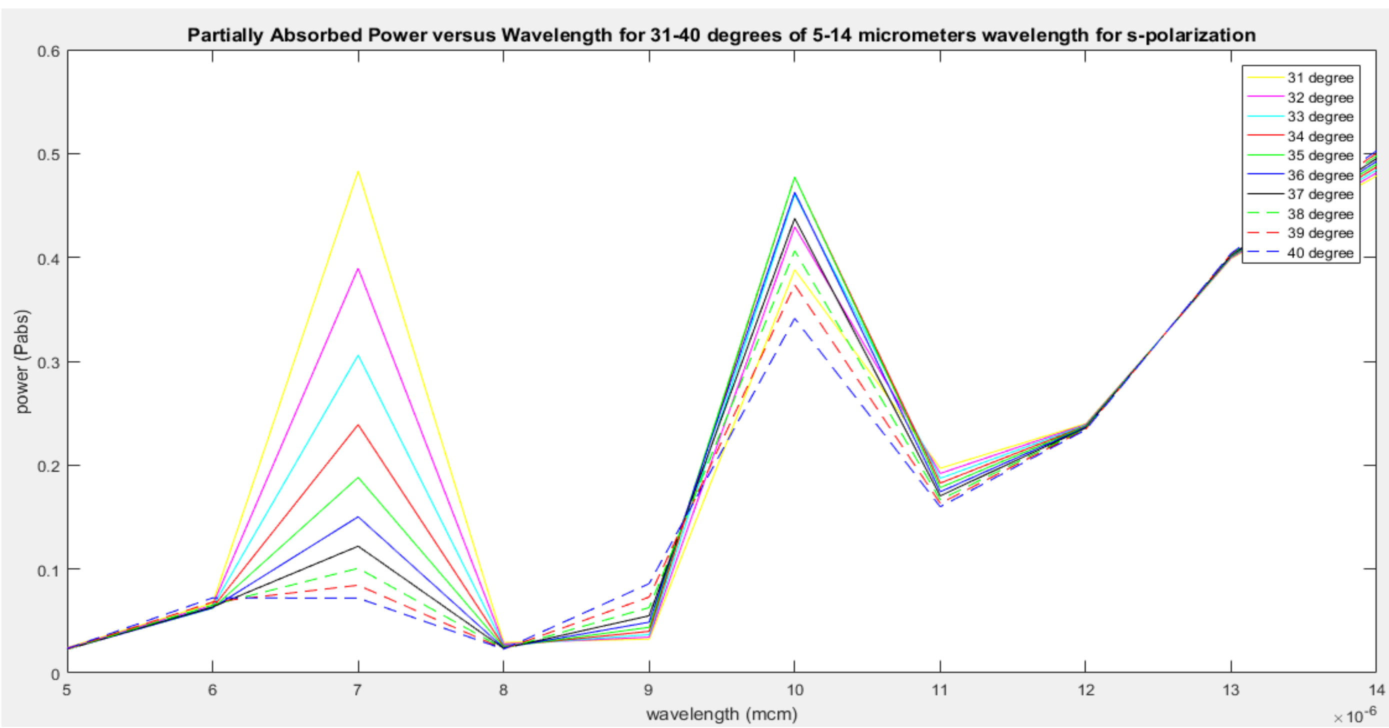


Figure 4-1-13 Partial Absorbed Power versus 5-14 μm wavelength for 31-40 degrees of s-polarization

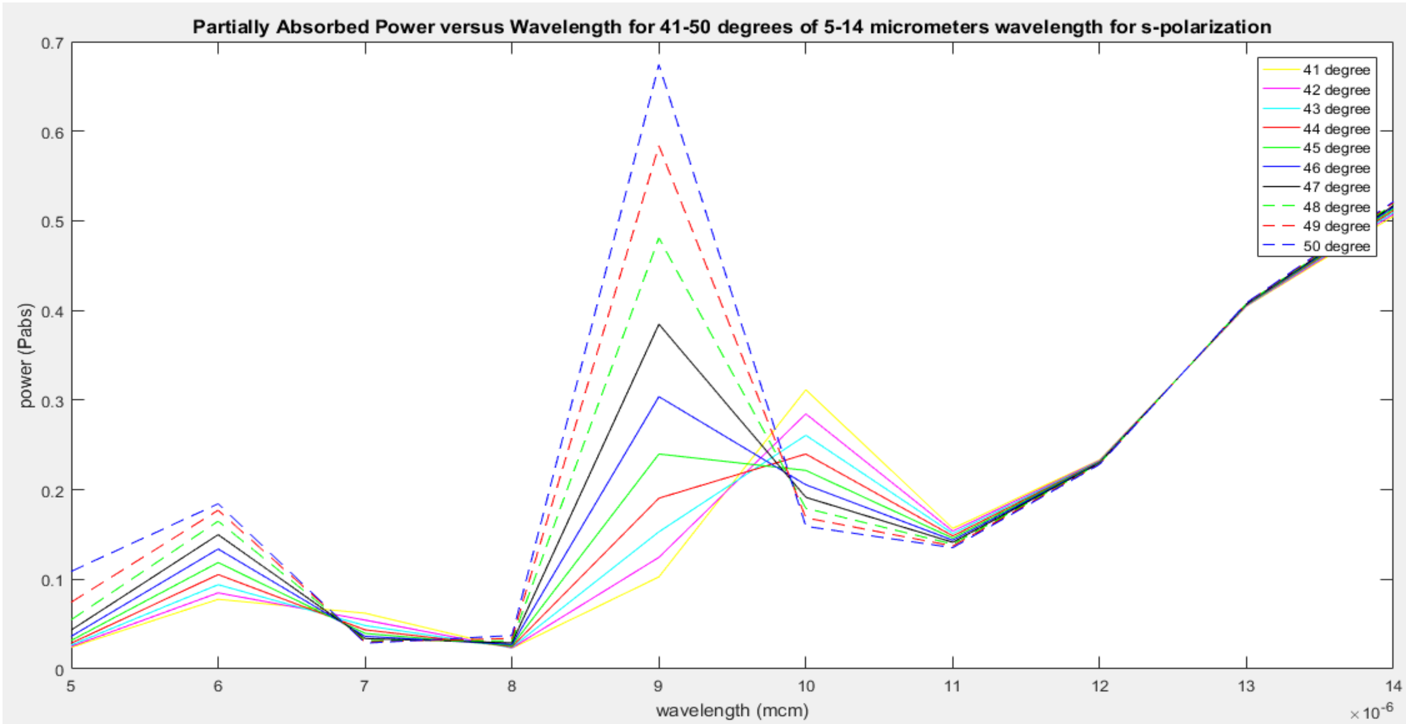


Figure 4-1-14 Partial Absorbed Power versus 5-14 µm wavelength for 41-50 degrees of s-polarization

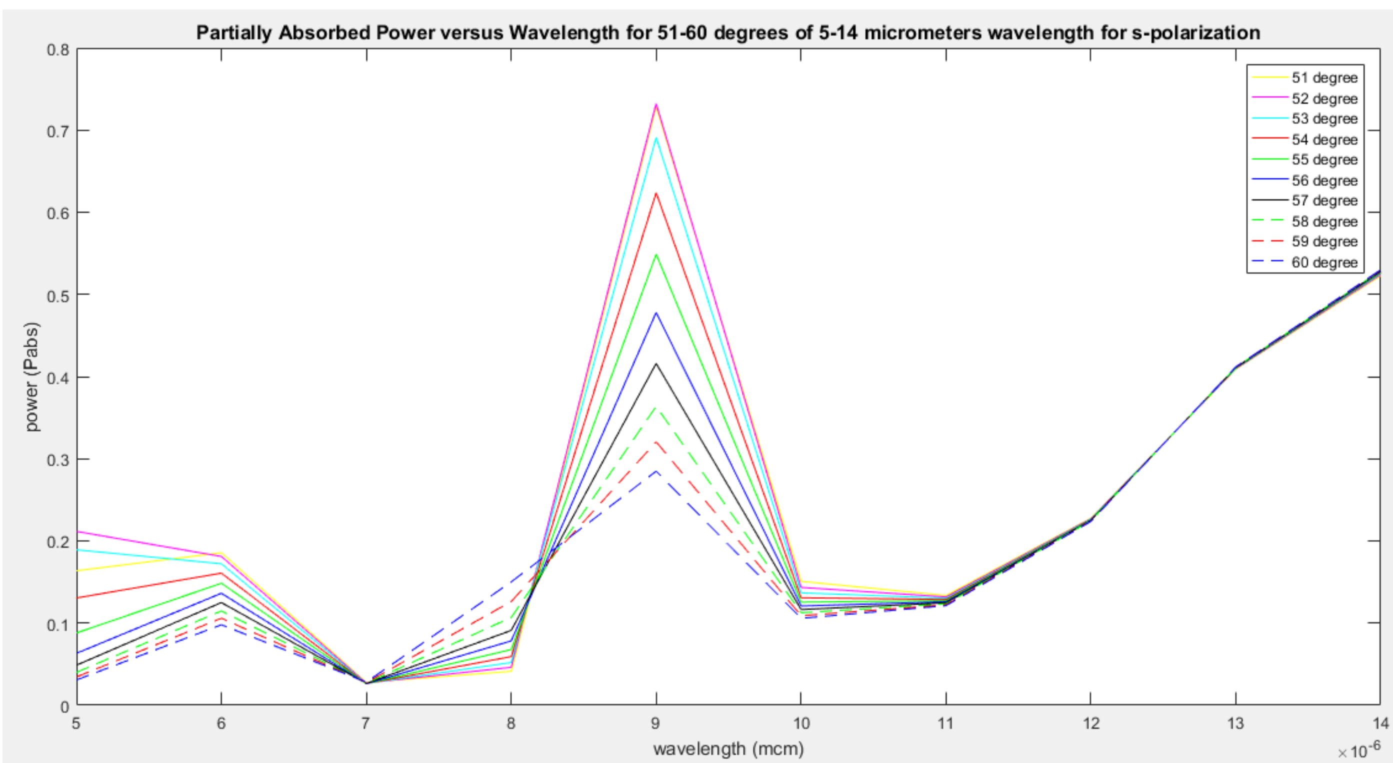


Figure 4-1-15 Partial Absorbed Power versus 5-14 µm wavelength for 51-60 degrees of s-polarization

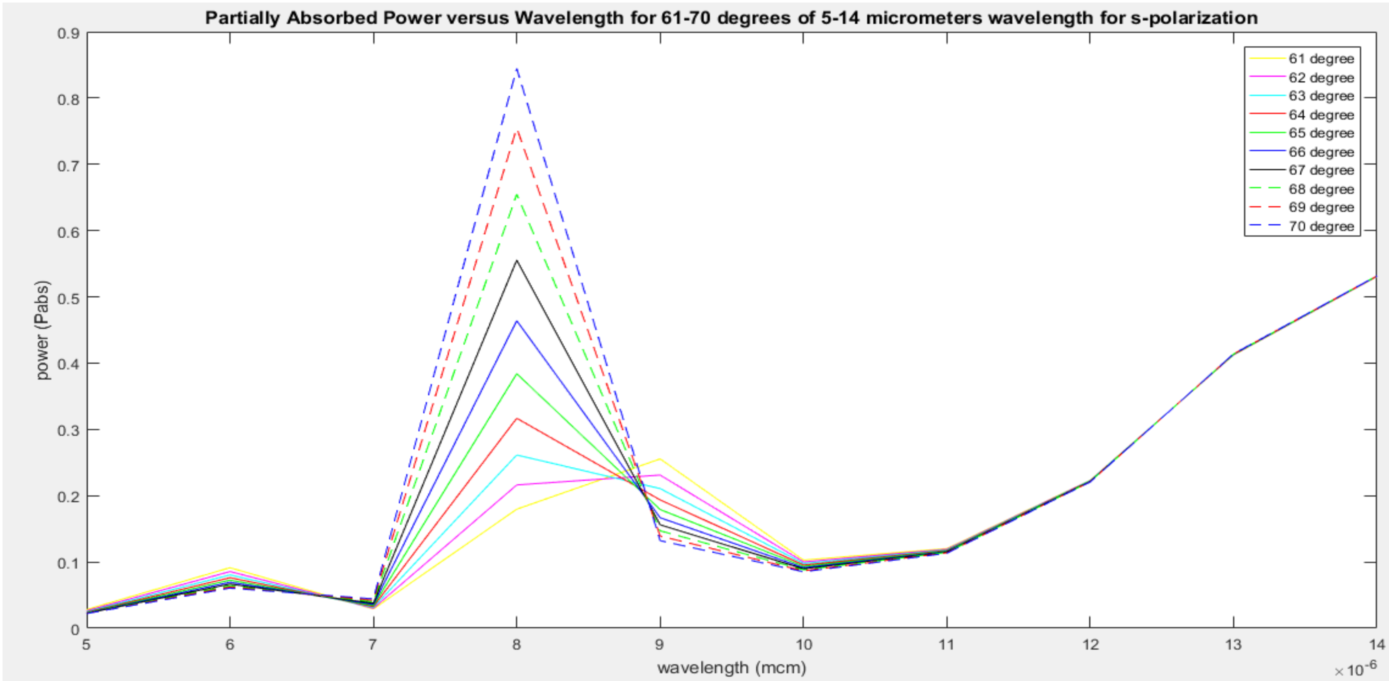


Figure 4-1-16 Partial Absorbed Power versus 5-14 μm wavelength for 61-70 degrees of s-polarization

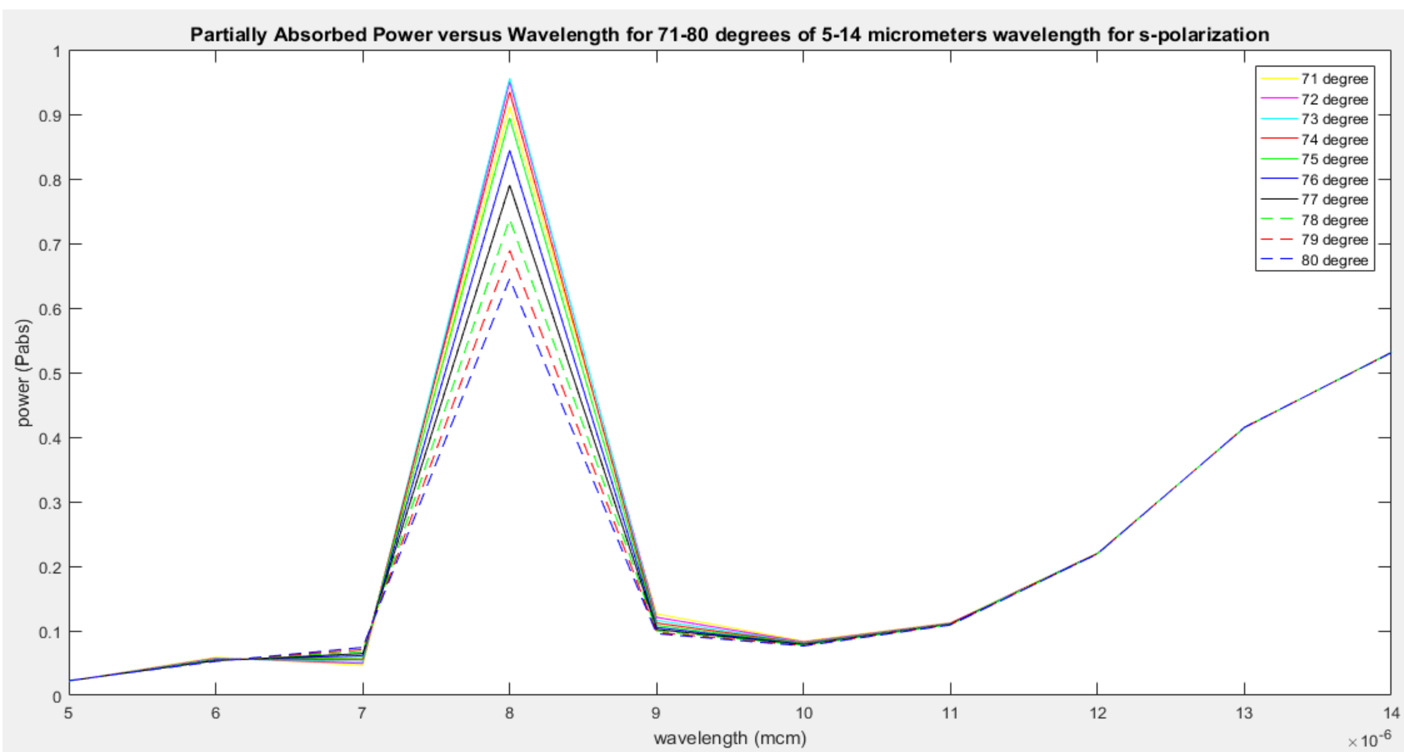


Figure 4-1-17 Partial Absorbed Power versus 5-14 μm wavelength for 71-80 degrees of s-polarization

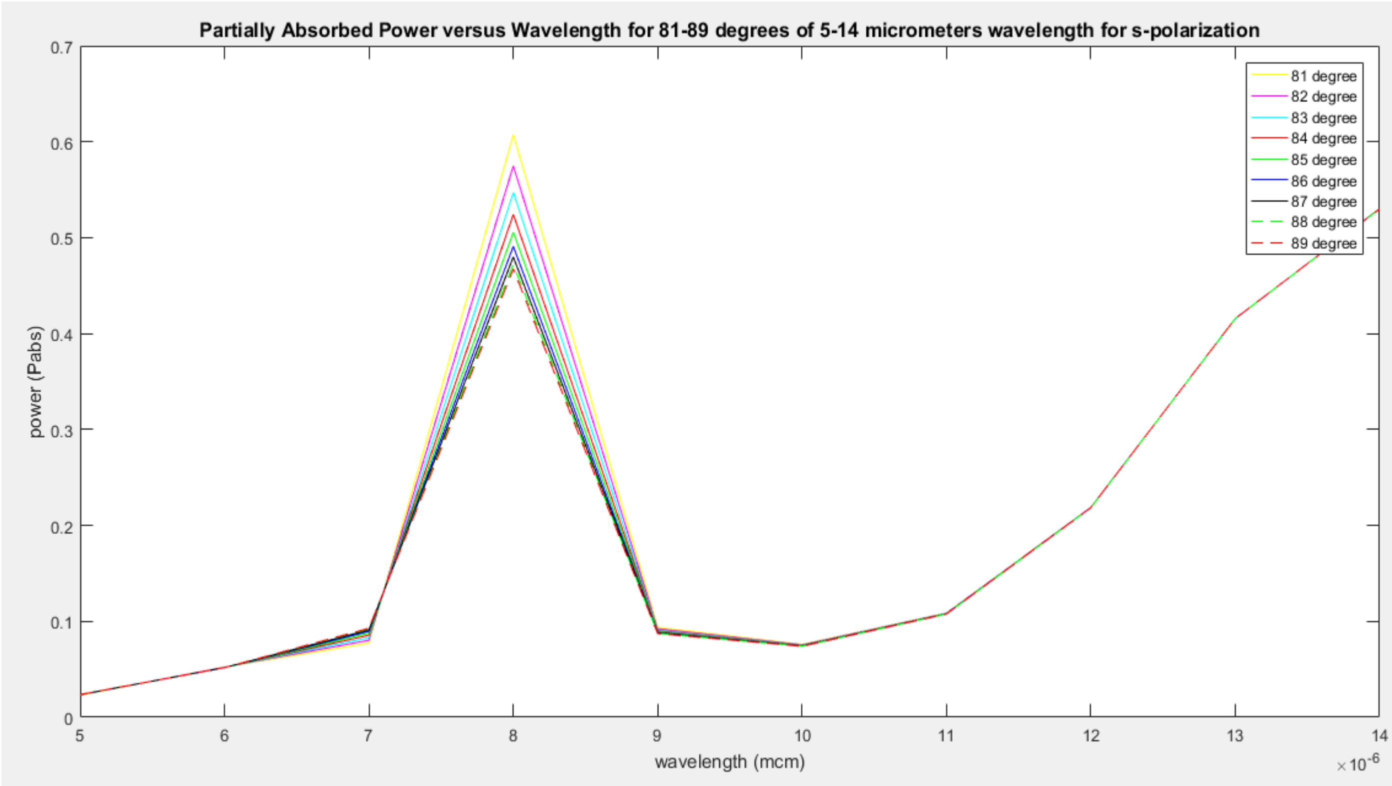


Figure 4-1-18 Partial Absorbed Power versus 5-14 μm wavelength for 81-89 degrees of s-polarization

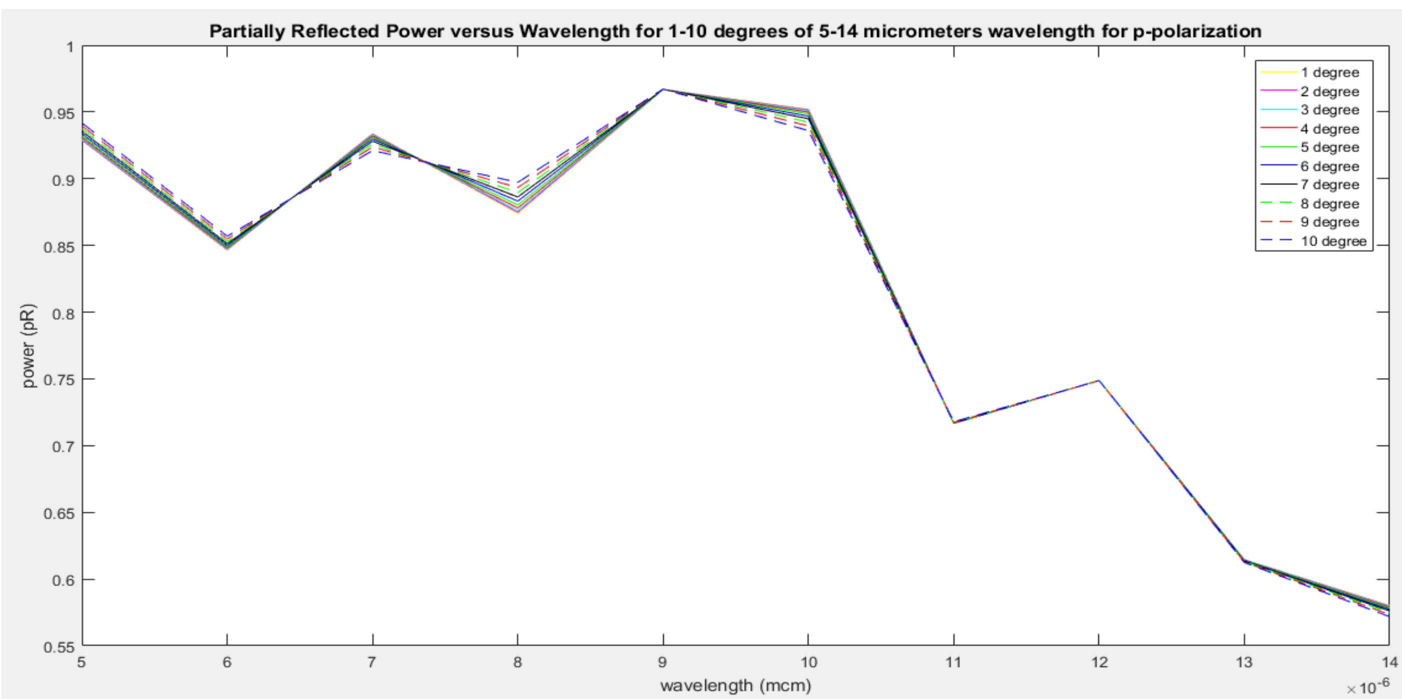


Figure 4-1-19 Partial Reflected Power versus 5-14 μm wavelength for 1-10 degrees of p-polarization

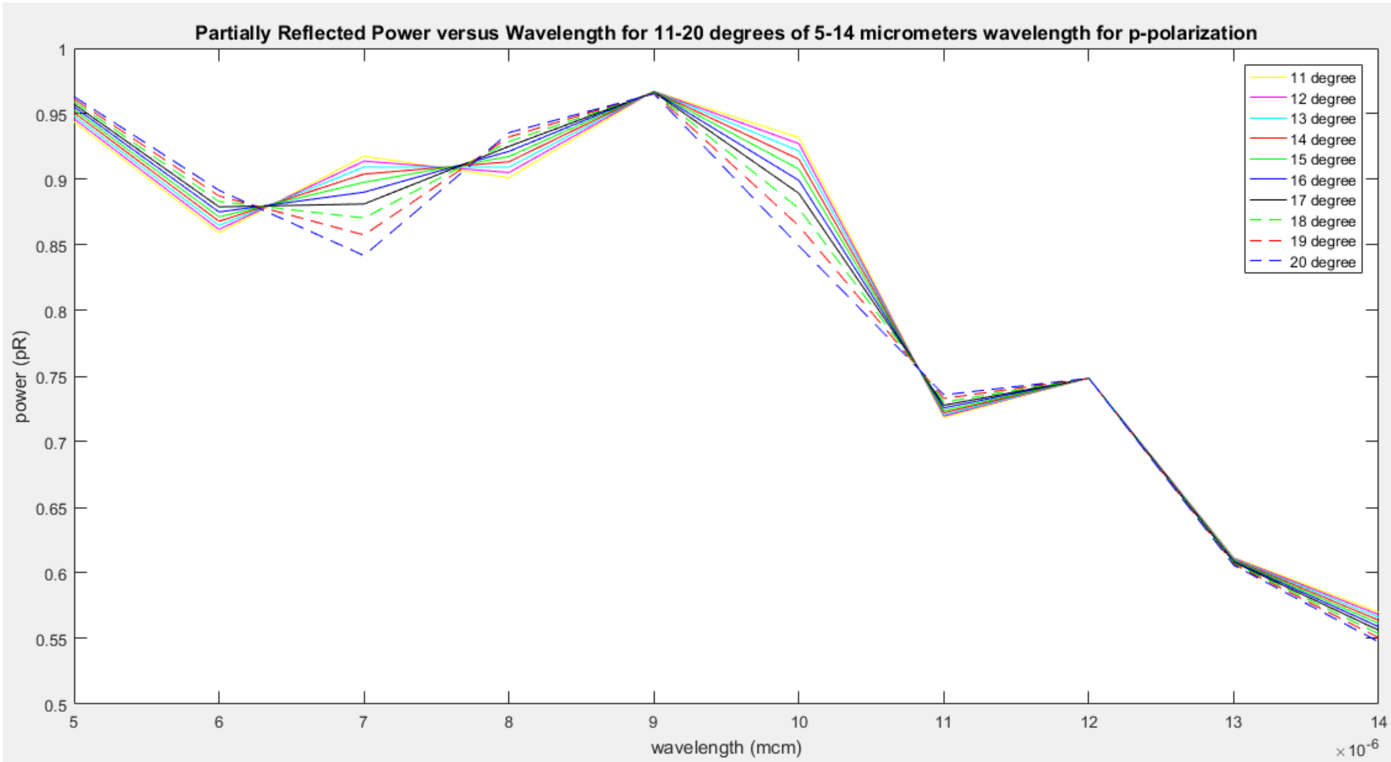


Figure 4-1-20 Partial Reflected Power versus 5-14 µm wavelength for 11-20 degrees of p-polarization

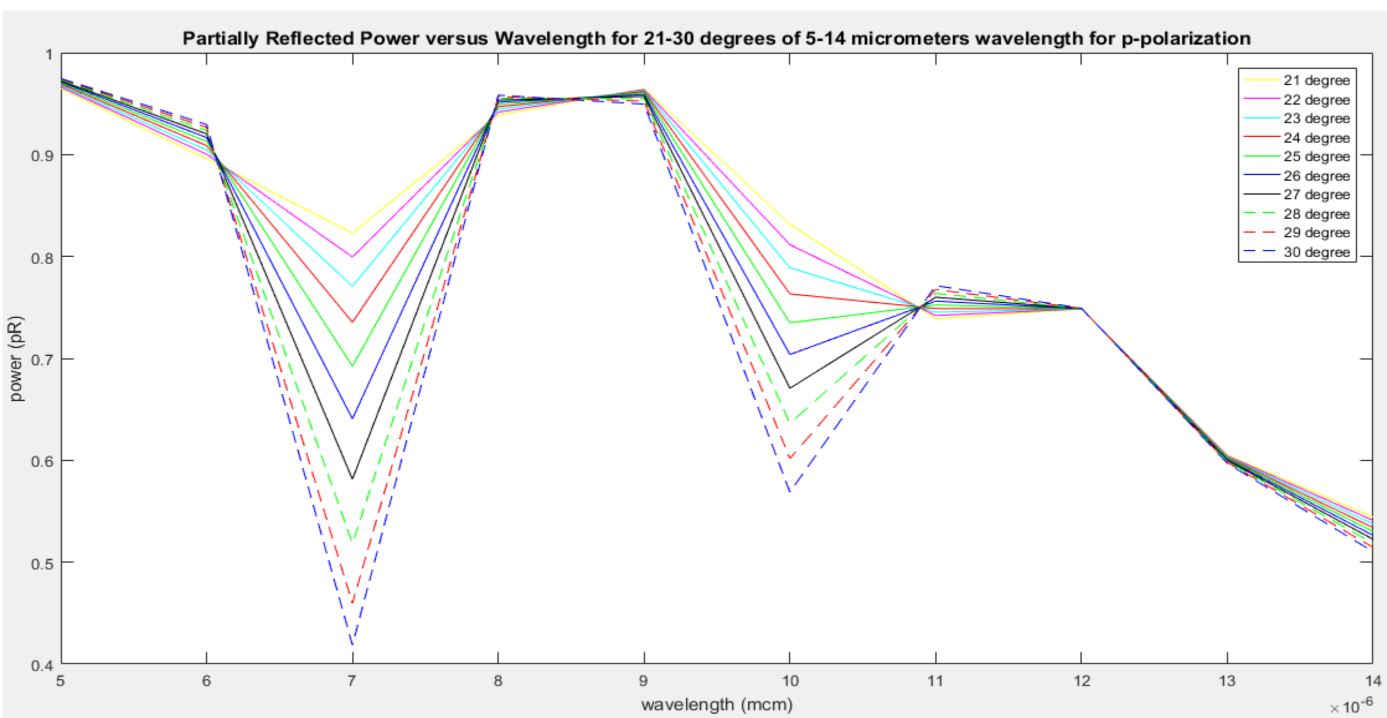


Figure 4-1-21 Partial Reflected Power versus 5-14 µm wavelength for 21-30 degrees of p-polarization

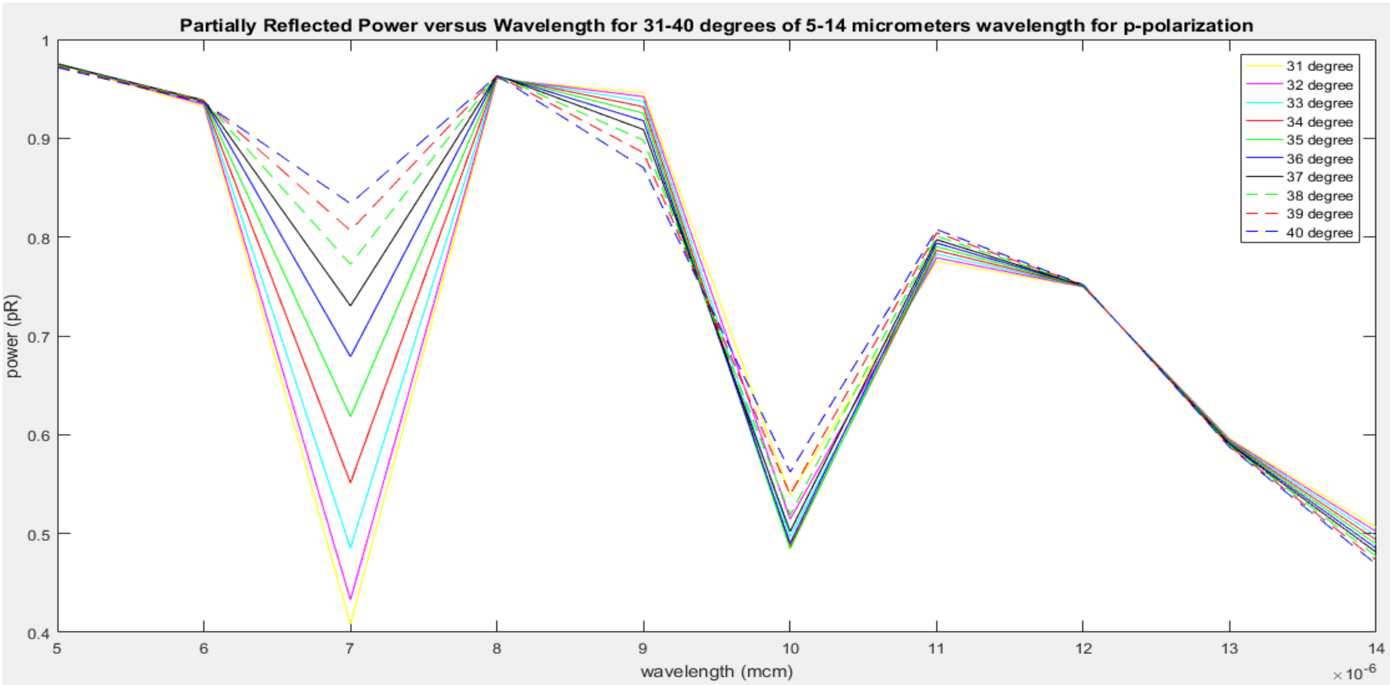


Figure 4-1-22 Partial Reflected Power versus 5-14 µm wavelength for 31-40 degrees of p-polarization

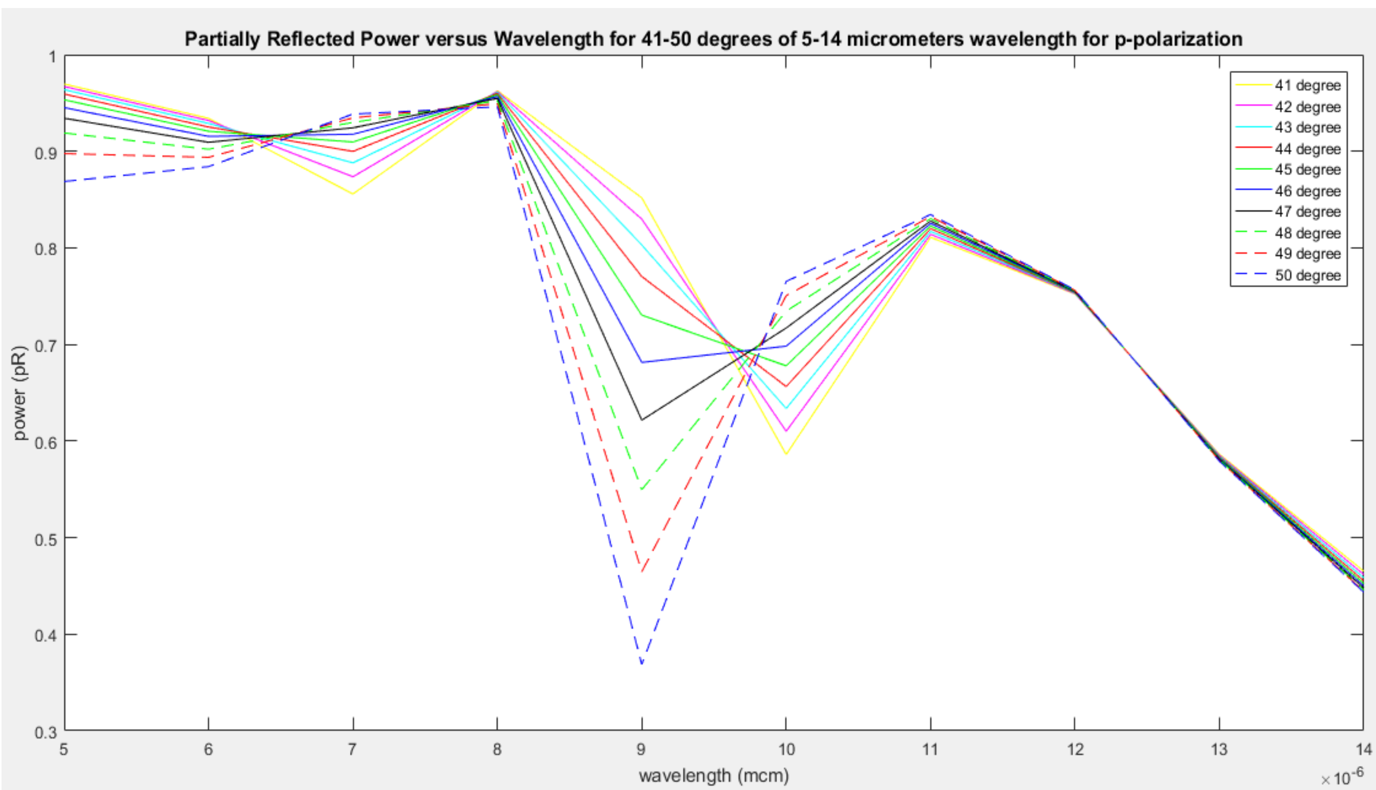


Figure 4-1-23 Partial Reflected Power versus 5-14 µm wavelength for 41-50 degrees of p-polarization

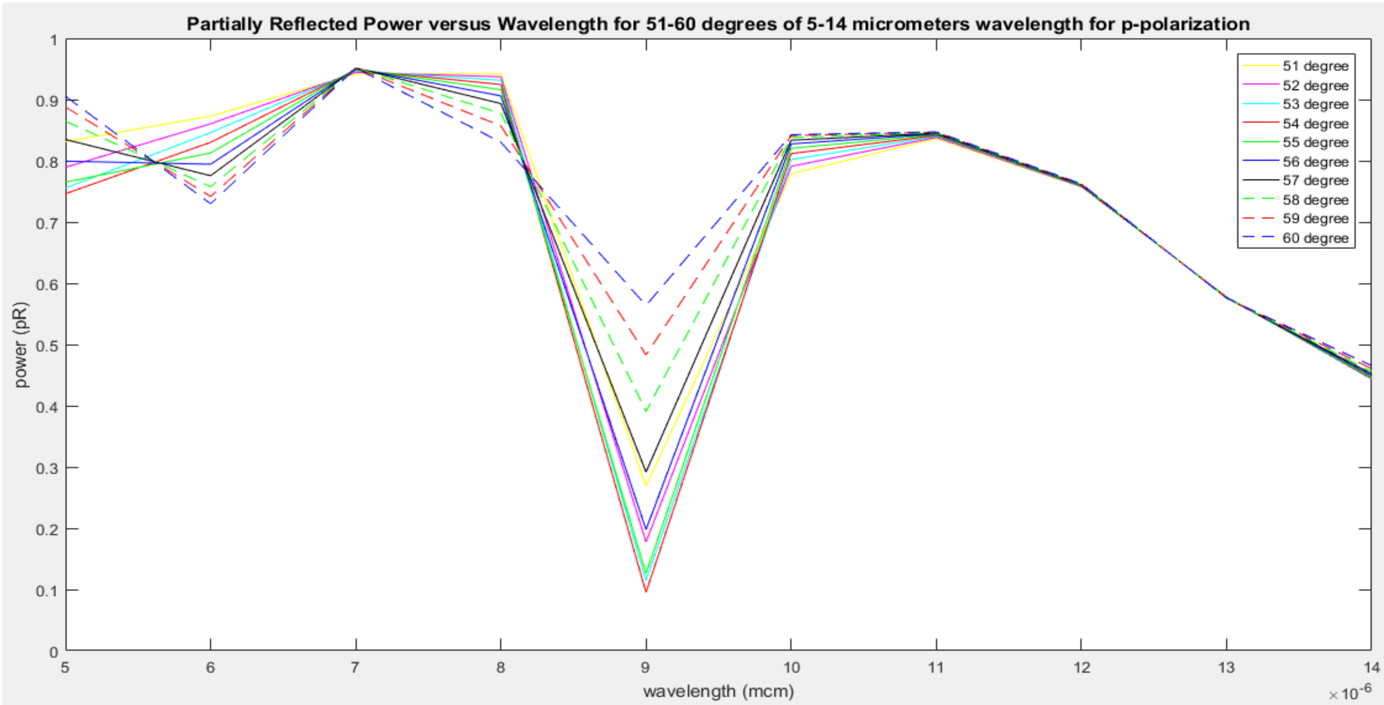


Figure 4-1-24 Partial Reflected Power versus 5-14 µm wavelength for 51-60 degrees of p-polarization

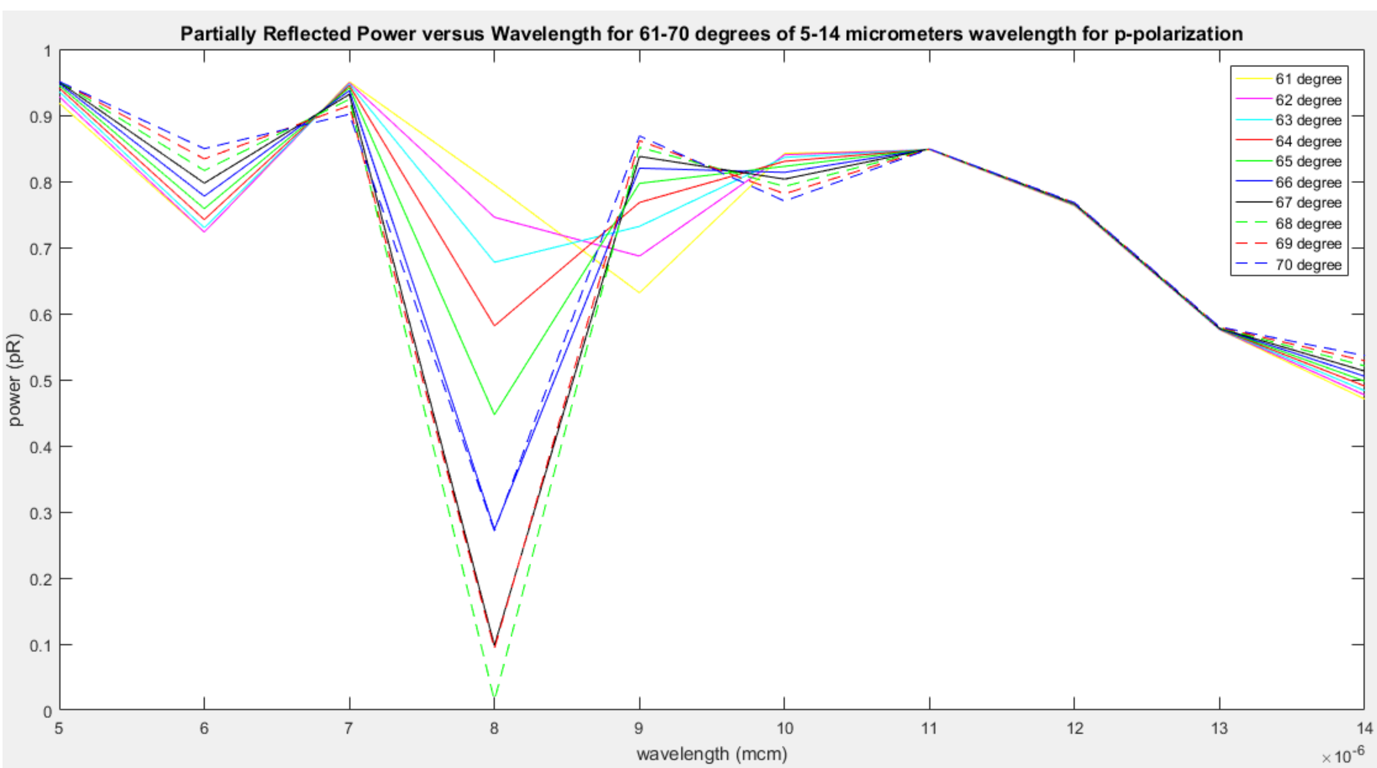


Figure 4-1-25 Partial Reflected Power versus 5-14 µm wavelength for 61-70 degrees of p-polarization

Figure 4-1-26 Partial Reflected Power versus 5-14 µm wavelength for 71-80 degrees of p-polarization

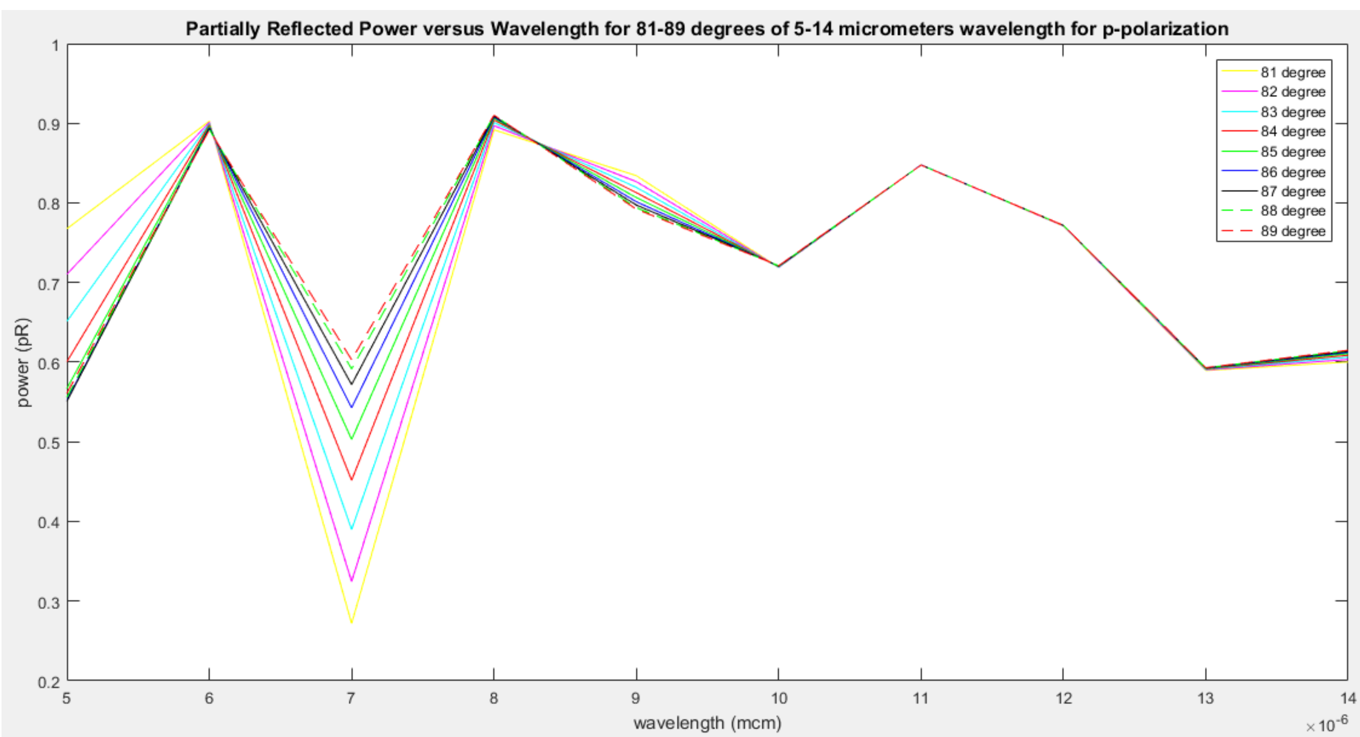


Figure 4-1-27 Partial Reflected Power versus 5-14 µm wavelength for 81-89 degrees of p-polarization

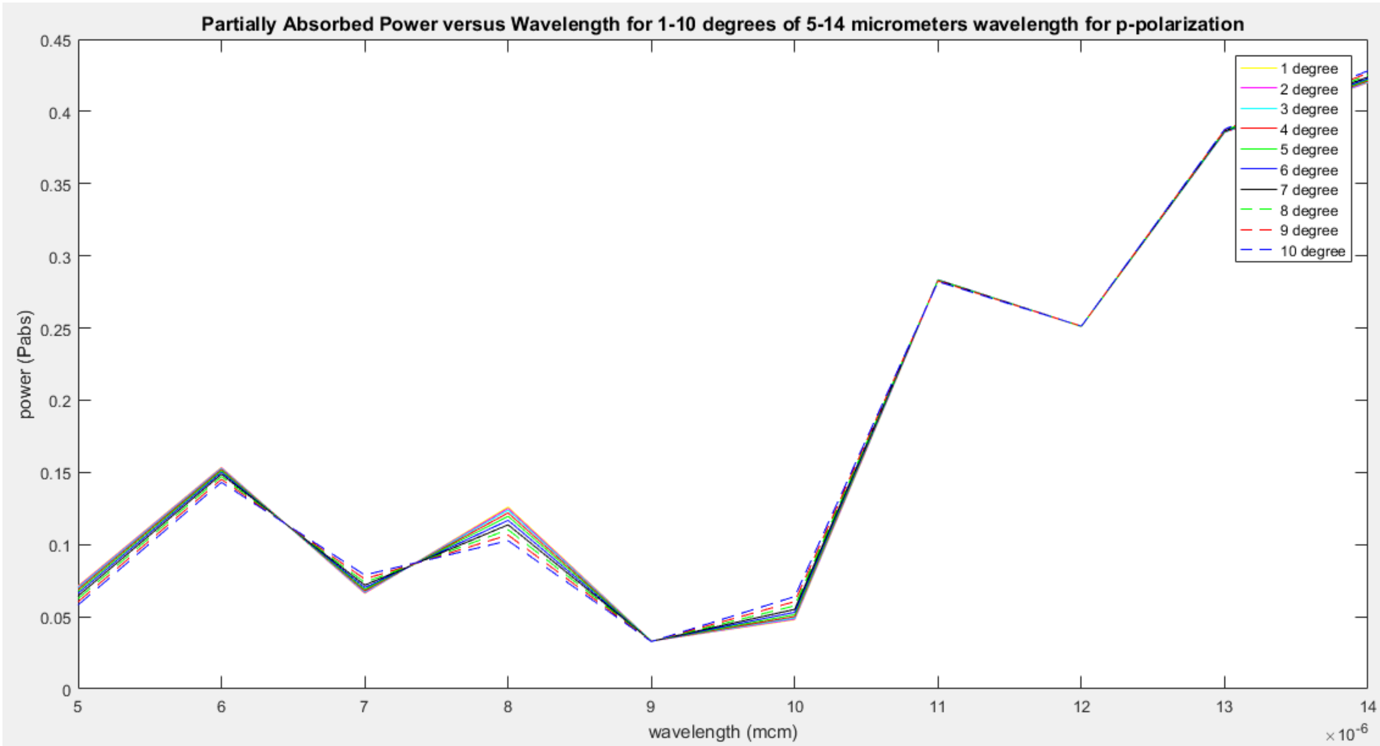


Figure 4-1-28 Partial Absorbed Power versus 5-14 µm wavelength for 1-10 degrees of p-polarization

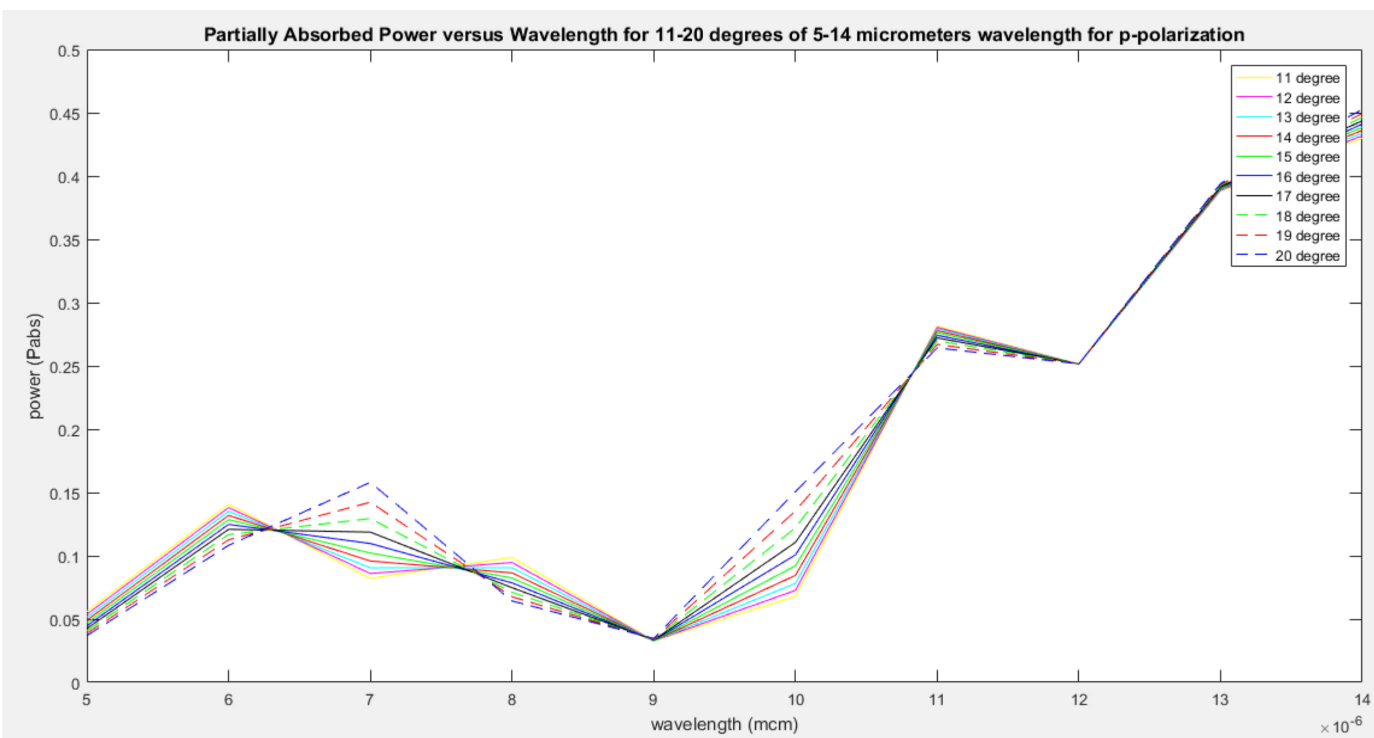


Figure 4-1-29 Partial Absorbed Power versus 5-14 µm wavelength for 11-20 degrees of p-polarization

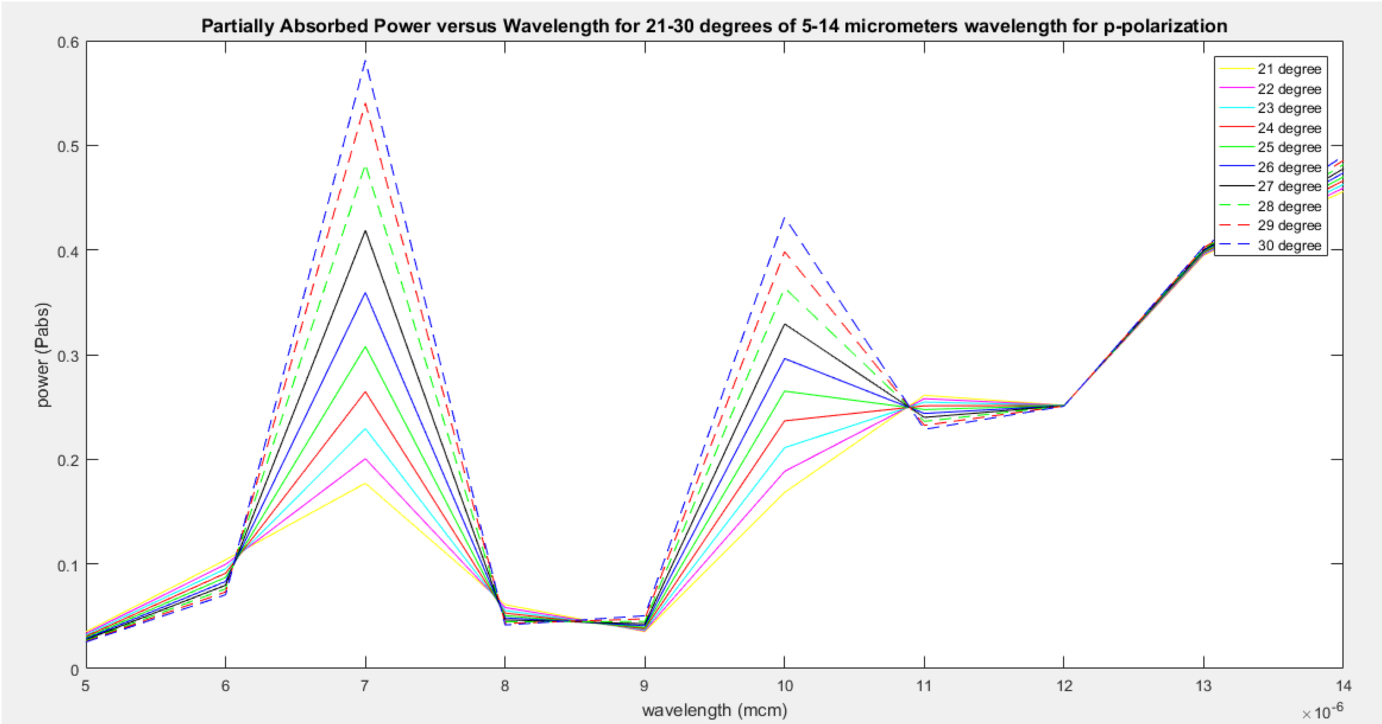


Figure 4-1-30 Partial Absorbed Power versus 5-14 µm wavelength for 21-30 degrees of p-polarization

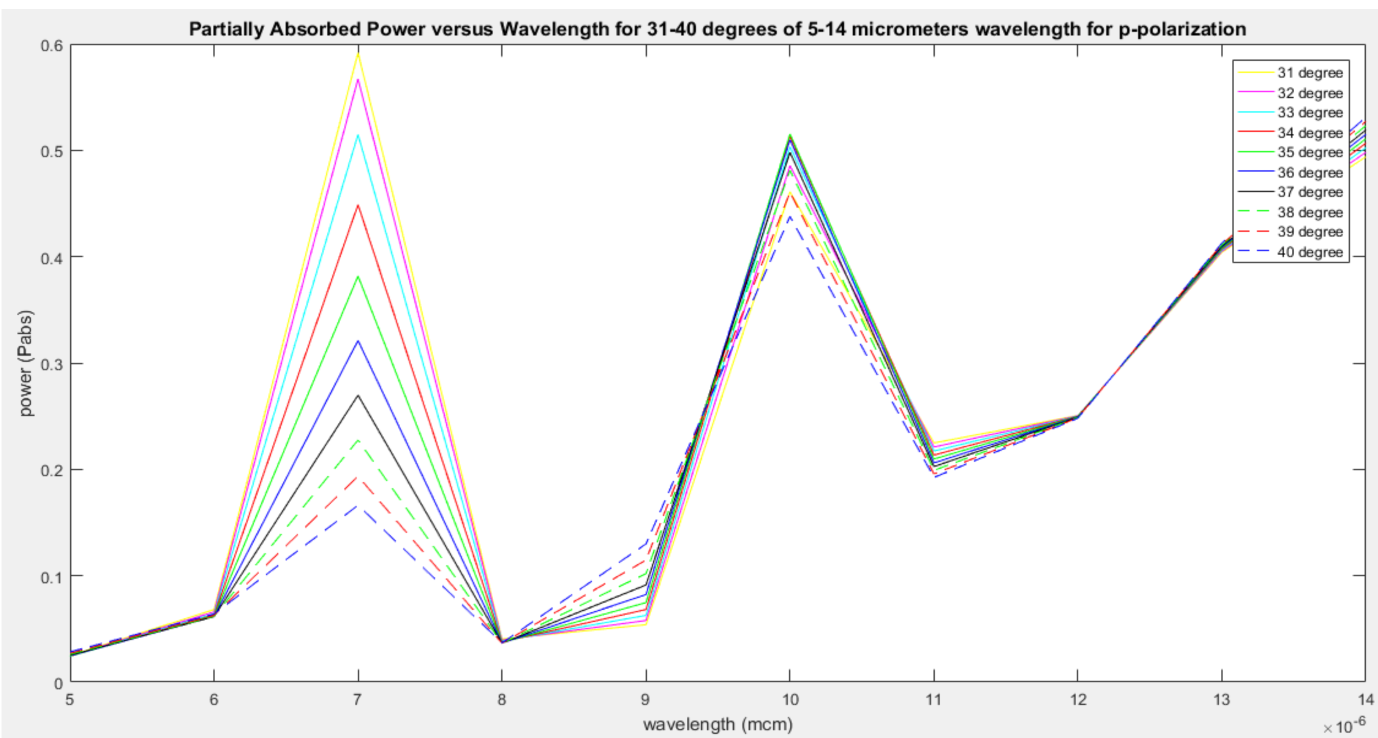


Figure 4-1-31 Partial Absorbed Power versus 5-14 µm wavelength for 31-40 degrees of p-polarization

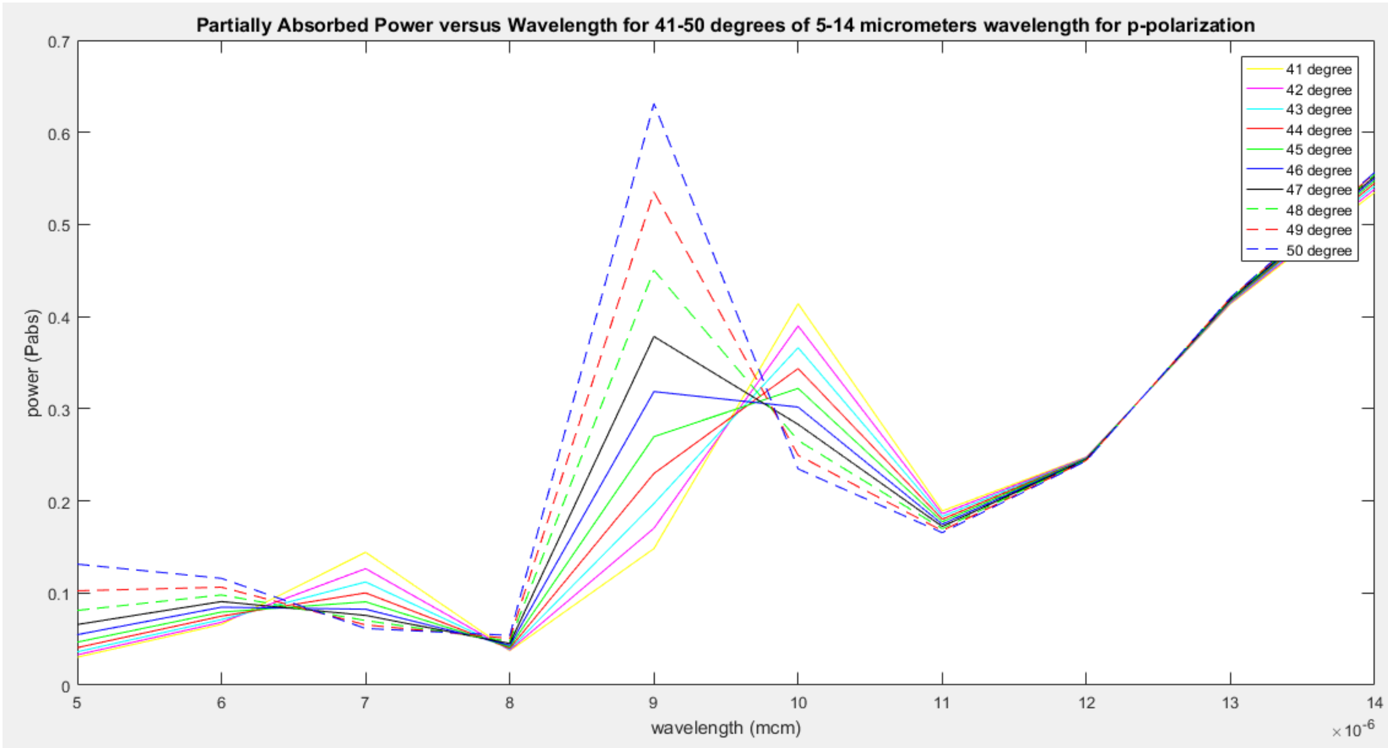


Figure 4-1-32 Partial Absorbed Power versus 5-14 μm wavelength for 41-50 degrees of p-polarization

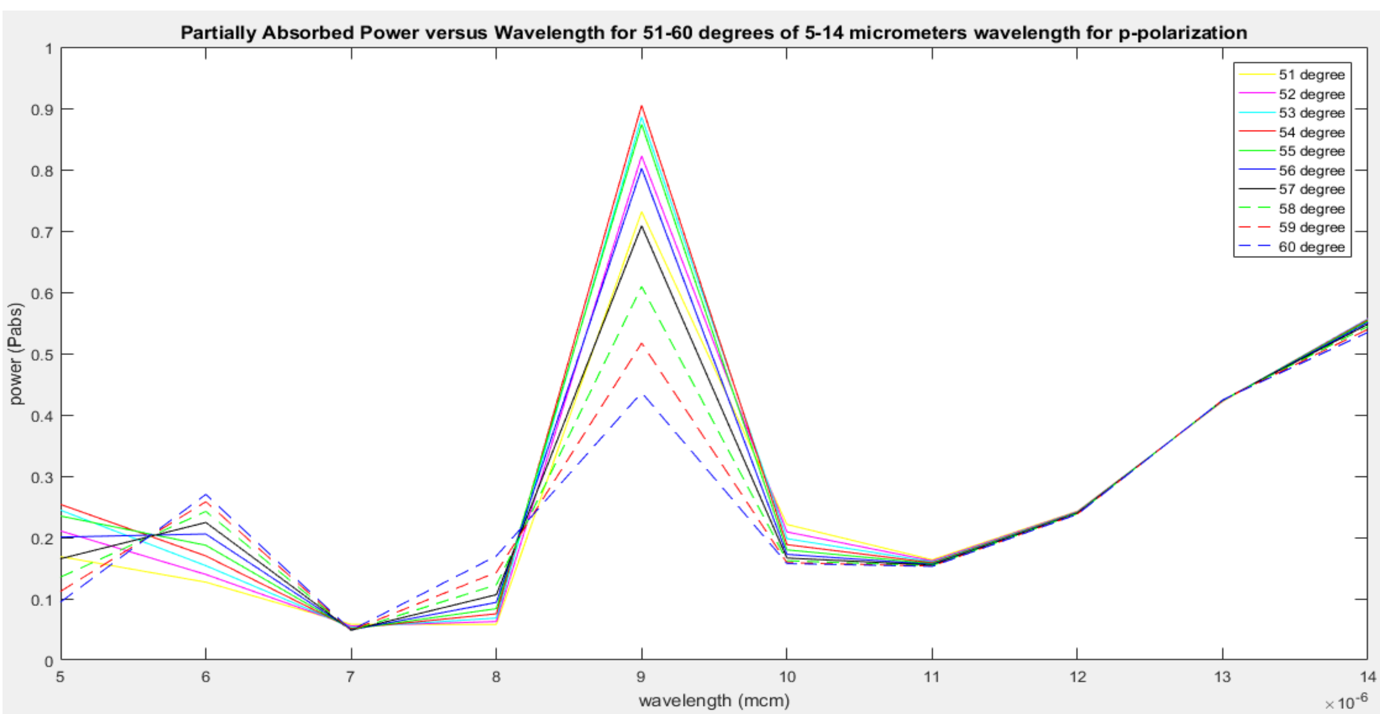


Figure 4-1-33 Partial Absorbed Power versus 5-14 μm wavelength for 51-60 degrees of p-polarization

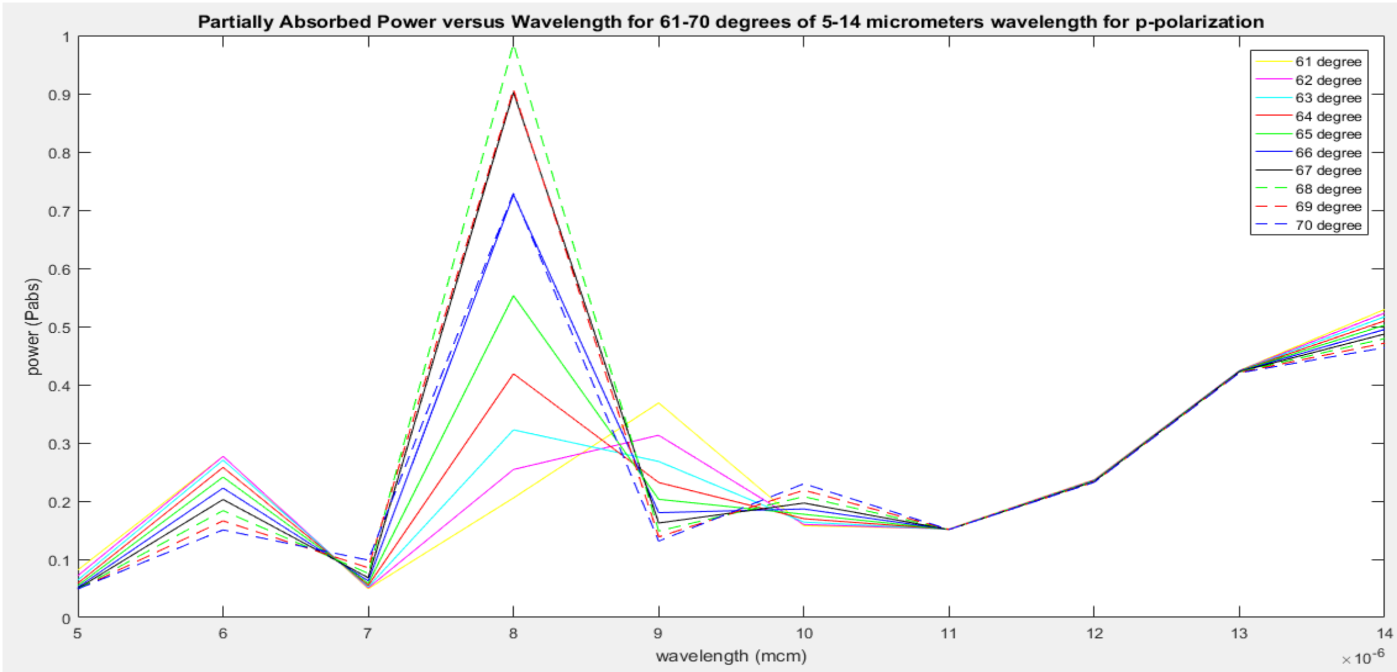


Figure 4-1-34 Partial Absorbed Power versus 5-14 µm wavelength for 61-70 degrees of p-polarization

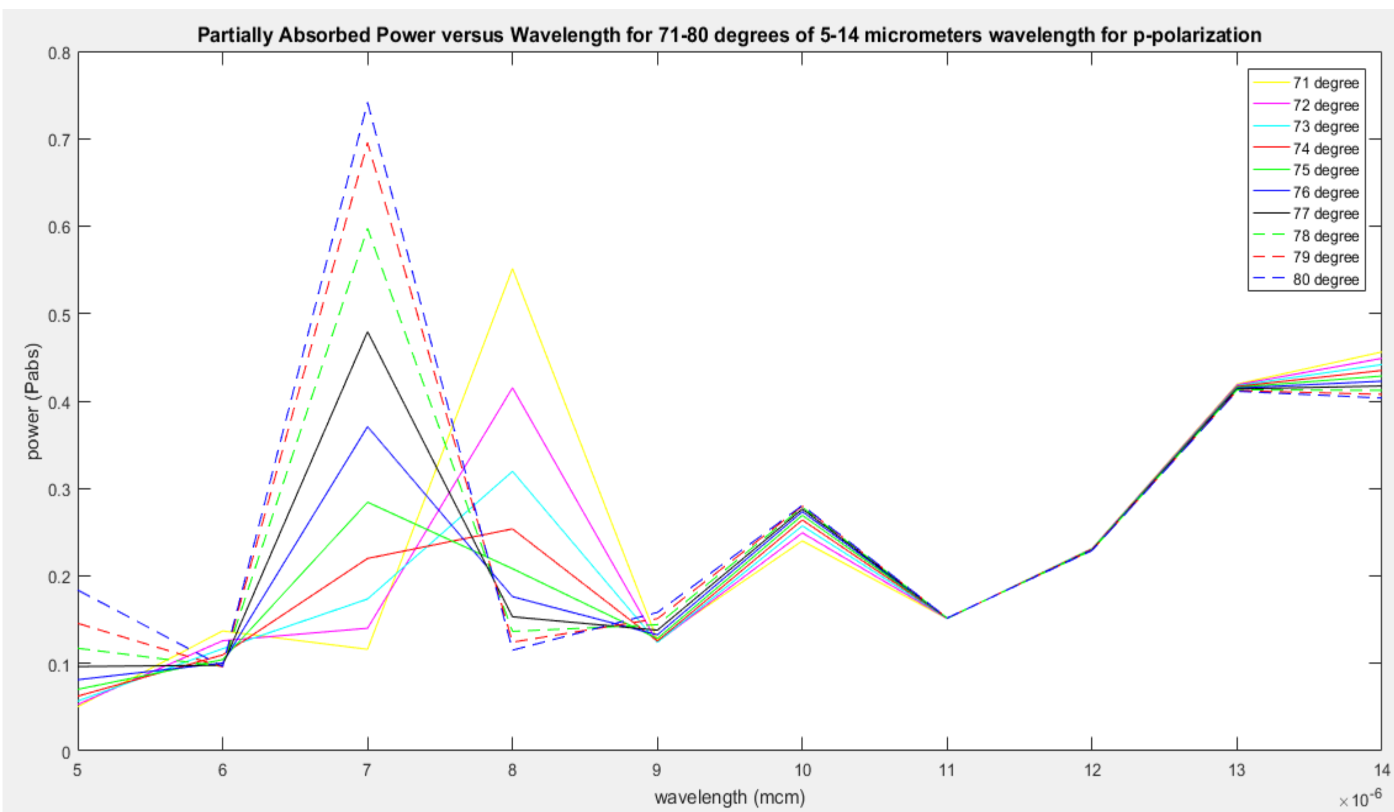


Figure 4-1-35 Partial Absorbed Power versus 5-14 µm wavelength for 71-80 degrees of p-polarization

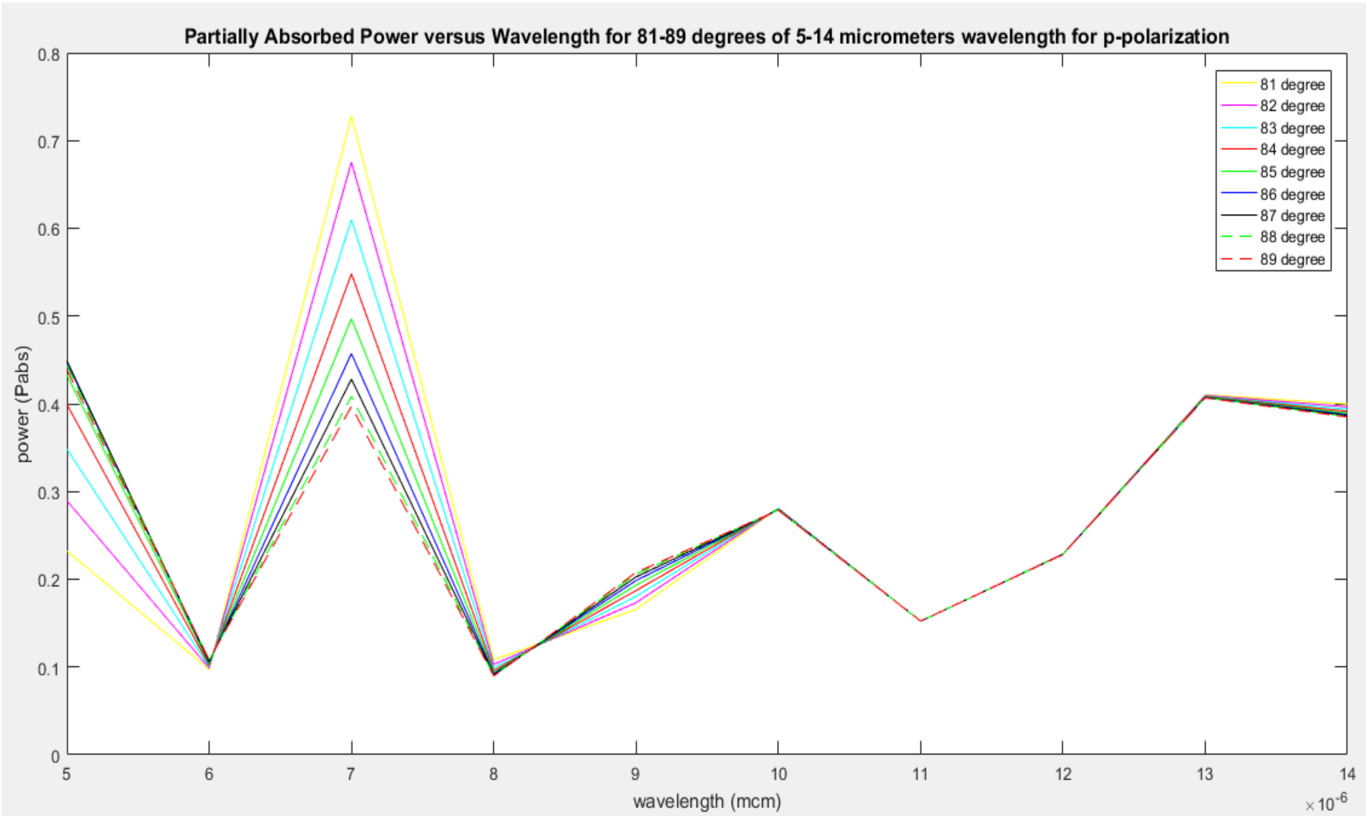


Figure 4-1-36 Partial Absorbed Power versus 5-14 μm wavelength for 81-89 degrees of p-polarization

4.1.1 Discussions

Table 4-1-1 Comparison of maximum partial reflected power values for sensor models with and without filter for normal incidence and sensor models with filters for s and p polarizations with their respective angles at 5-14 μm wavelength

Wavelength	Normal Incidence (with filter)	Normal Incidence (without filter)	s – polarization (maximum values)	p – polarization (maximum values)
5 μm	0.9285	0.9603	0.9780 (at 71^0)	0.9716 (at 40^0)
6 μm	0.8464	0.8482	0.9483 (at 87^0, 88^0, 89^0)	0.9385 (at 37^0)

7 µm	0.9339	0.8763	0.9738 (at 55^0, 56^0)	0.9517 (at 58^0, 59^0)
8 µm	0.8738	0.7266	0.9771 (at 40^0)	0.9636 (at 38^0)
9 µm	0.9668	0.6344	0.9725 (at 22^0, 23^0, 24^0)	0.9672 (at 10^0, 11^0, 12^0, 13^0)
10 µm	0.9521	0.6736	0.9521 (at 1^0)	0.9520 (at 1^0)
11 µm	0.7168	0.2320	0.8923 (at 88^0, 89^0)	0.8490 (at 66^0, 67^0, 68^0, 69^0)
12 µm	0.7490	0.3087	0.7815 (at 87^0, 88^0, 89^0)	0.7718 (at 88^0, 89^0)
13 µm	0.6146	0.2879	0.6145 (at 1^0, 2^0)	0.6145 (at 1^0, 2^0)
14 µm	0.5802	0.3029	0.5801 (at 1^0)	0.6150 (at 89^0)

Table 4-1-2 comparison of maximum partial absorbed power values along with their respective angles for s and p polarizations across the wavelengths of 5-14 µm

Wavelength	s – polarization (maximum values)	p – polarization (maximum values)
5 µm	0.2116 - 0.0000i (at 52^0)	0.4490 - 0.0000i (at 87^0)
6 µm	0.1856 - 0.0000i (at 51^0)	0.2768 - 0.0000i (at 61^0, 62^0)
7 µm	0.6054 - 0.0000i (at 29^0)	0.7415 - 0.0000i (at 80^0)
8 µm	0.9559 - 0.0000i (at 73^0)	0.9855 - 0.0000i (at 68^0)
9 µm	0.7322 - 0.0000i (at 52^0)	0.9048 - 0.0000i (at 54^0)
10 µm	0.4774 - 0.0000i (at 35^0)	0.5153 - 0.0000i (at 35^0)
11 µm	0.2872 - 0.0000i (at 9^0, 10^0)	0.2834 - 0.0000i (at 5^0)
12 µm	0.2510 - 0.0000i (at 1^0)	0.2516 - 0.0000i (at 17^0, 18^0, 19^0, 20^0, 21^0)

13 µm	0.4158 - 0.0000i (at 87^0, 88^0, 89^0)	0.4245 - 0.0000i (at 59^0, 60^0, 61^0)
14 µm	0.5317 - 0.0000i (at 67^0, 68^0, 69^0, 70^0)	0.5570 - 0.0000i (at 51^0)

From the tabular data we observe that the partial reflected power has a higher magnitude when it comes to s and p polarization's comparison with the normal incidence of radiation in the sensor structure having the Ge optical filter. The maximum partial absorbed power value peaks to 0.9559-0.0000i for a 8 µm light that is incident at 73^0 on the sensor structure having the Ge optical filter, in case of s-polarization for a range of 5-14 µm. For p polarization the peak value is observed at 0.9855-0.0000i for a 8 µm light incident at an angle of 68^0 on the sensor structure, having Ge as the optical filter over range of wavelengths from 5-14 µm. From the design point of view, in this sensor structure, we have simulated the structure using materials other than Si, i.e. SiGe. However, the performance remains unchanged. This is due to the constructive and destructive interference occurring across the top and bottom electrode, sandwiching the sensing material.

4.2 Results for Sensor Structure 1

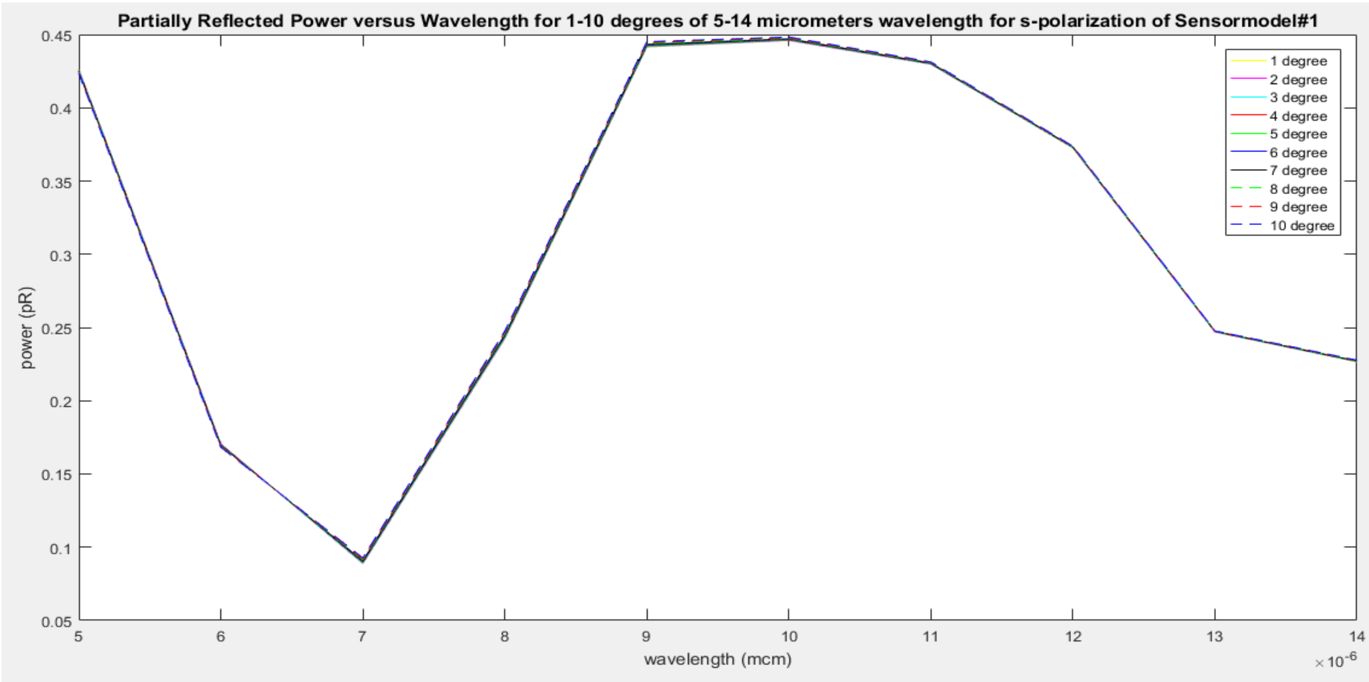


Figure 4-2-1 Partial Reflected Power versus 5-14 μm wavelength for 1-10 degrees of s-polarization

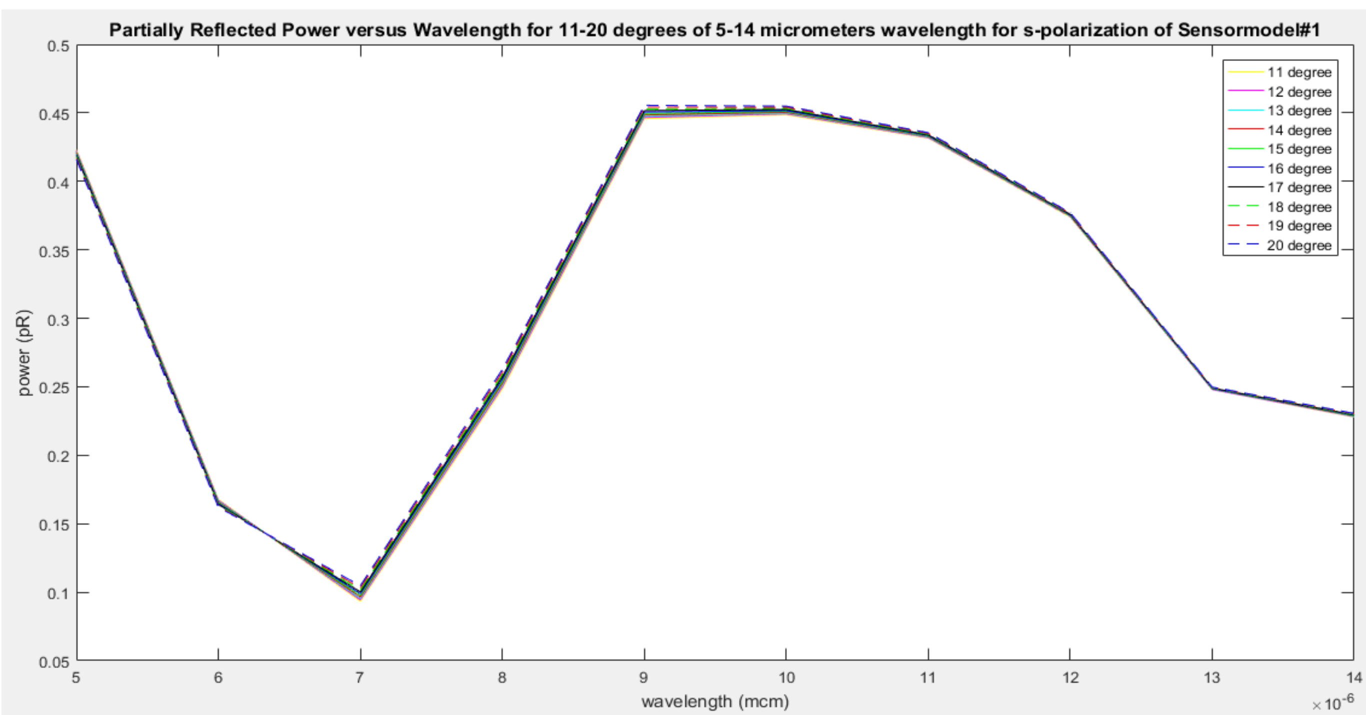


Figure 4-2-2 Partial Reflected Power versus 5-14 μm wavelength for 11-20 degrees of s-polarization

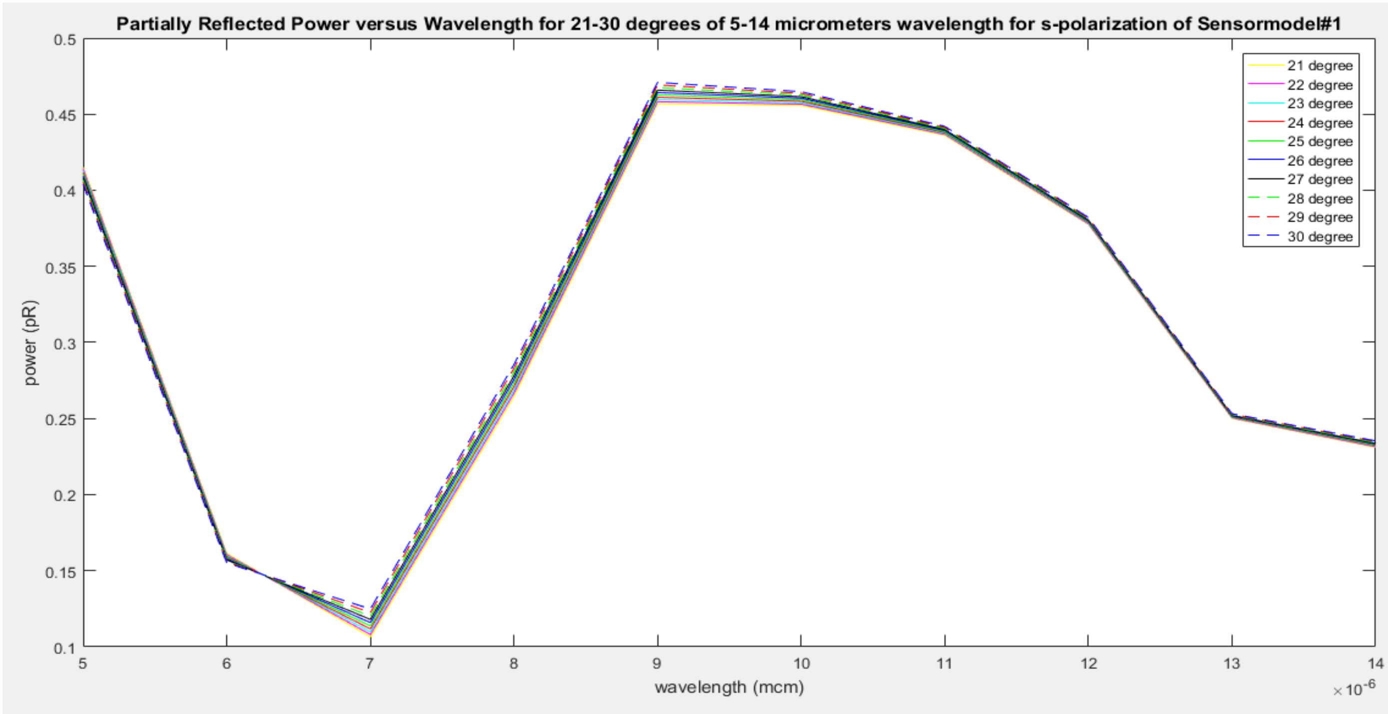


Figure 4-2-3 Partial Reflected Power versus 5-14 μm wavelength for 21-30 degrees of s-polarization

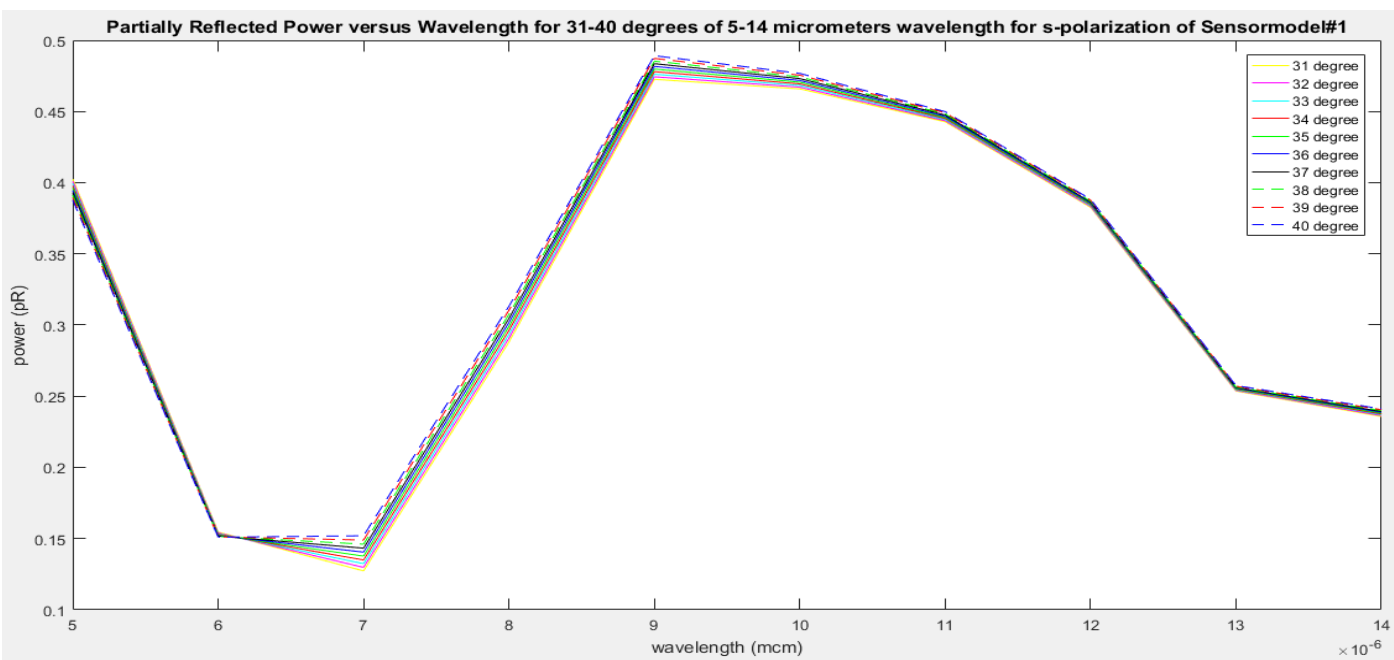


Figure 4-2-4 Partial Reflected Power versus 5-14 μm wavelength for 31-40 degrees of s-polarization

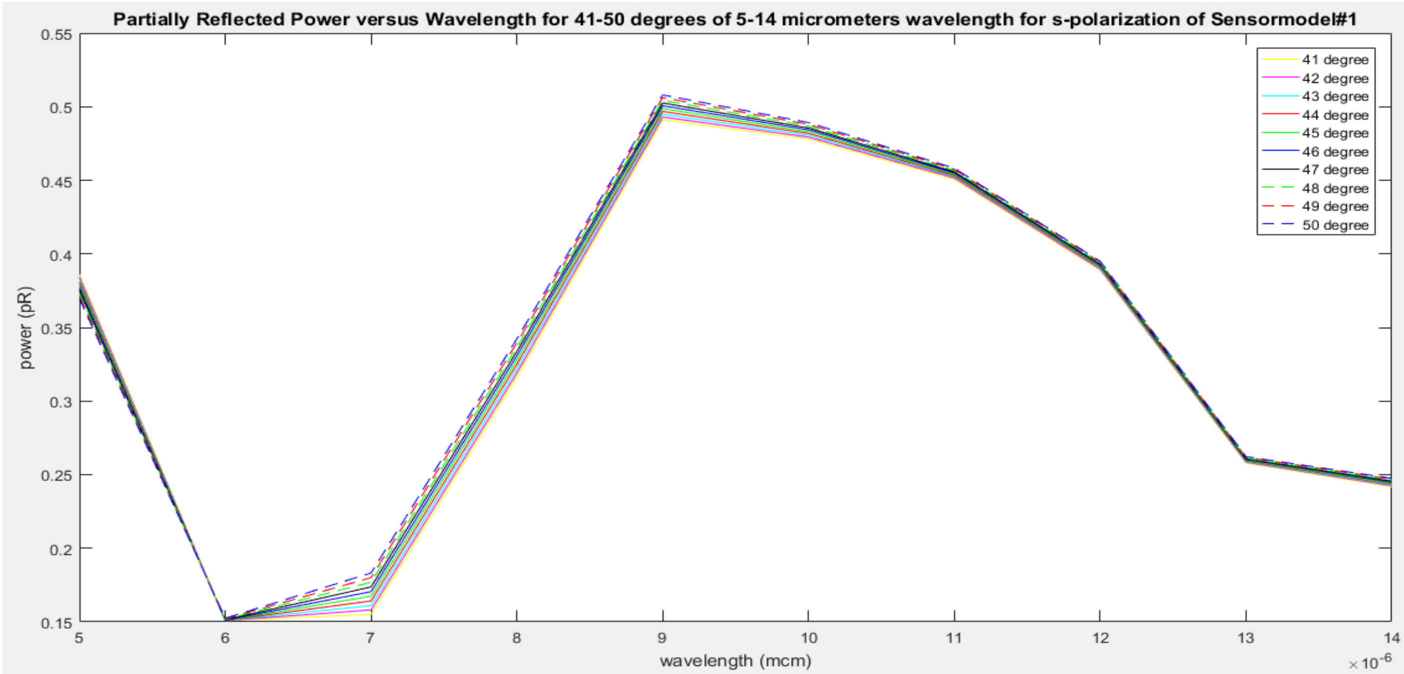


Figure 4-2-5 Partial Reflected Power versus 5-14 μm wavelength for 41-50 degrees of s-polarization

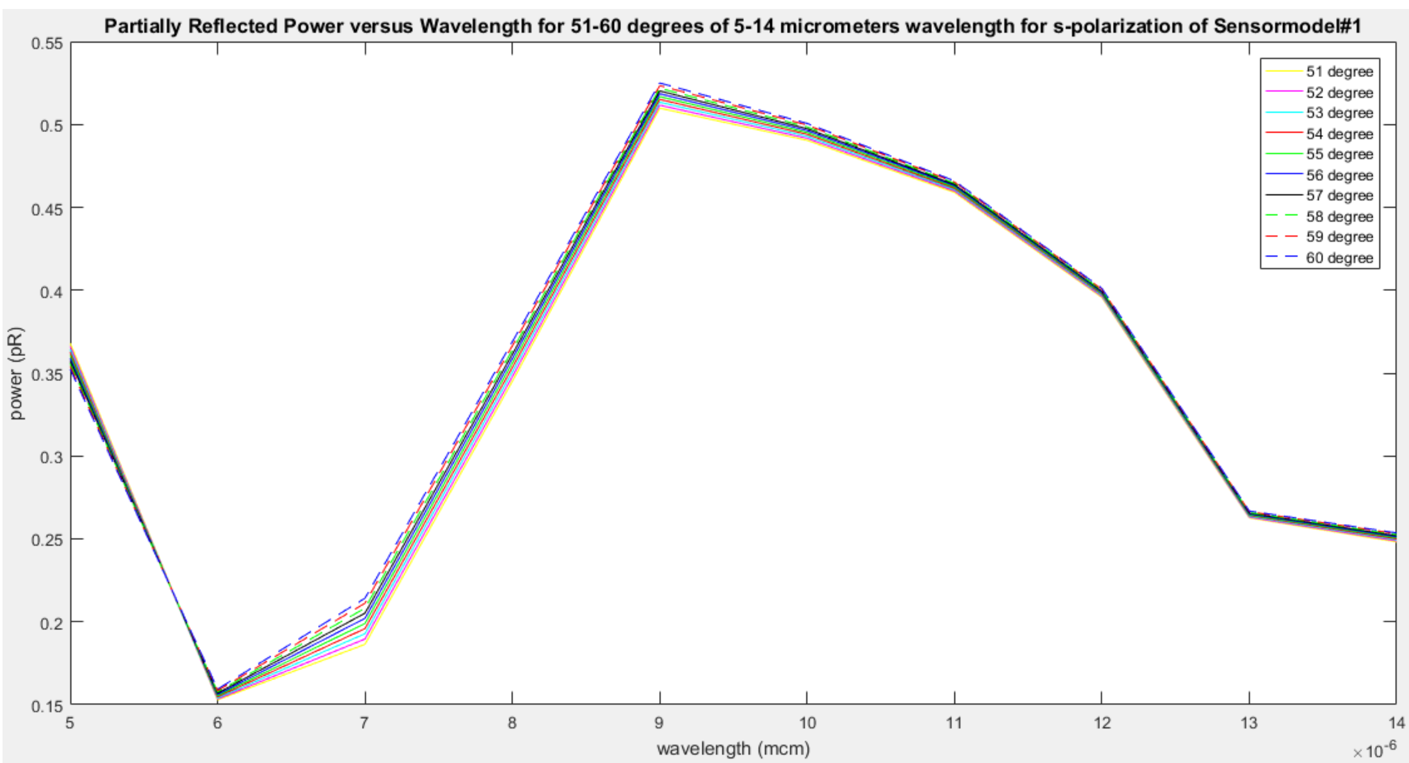


Figure 4-2-6 Partial Reflected Power versus 5-14 μm wavelength for 51-60 degrees of s-polarization

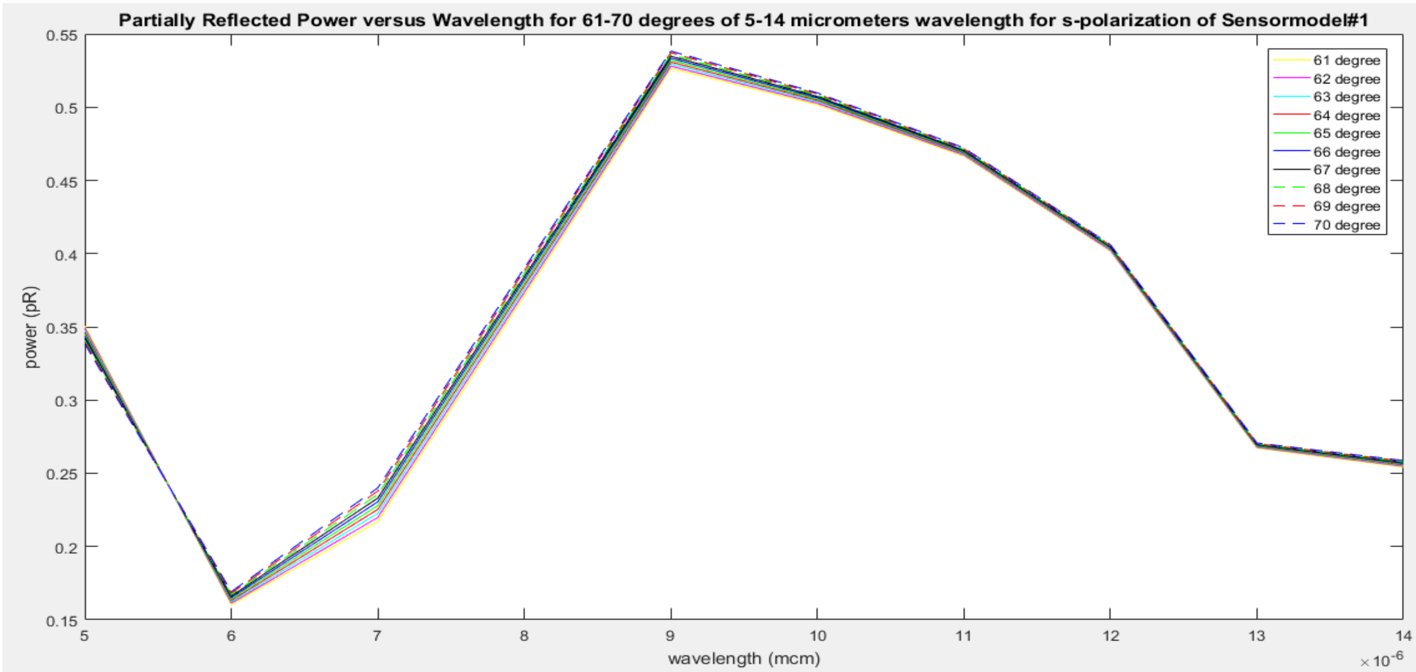


Figure 4-2-7 Partial Reflected Power versus 5-14 μm wavelength for 61-70 degrees of s-polarization

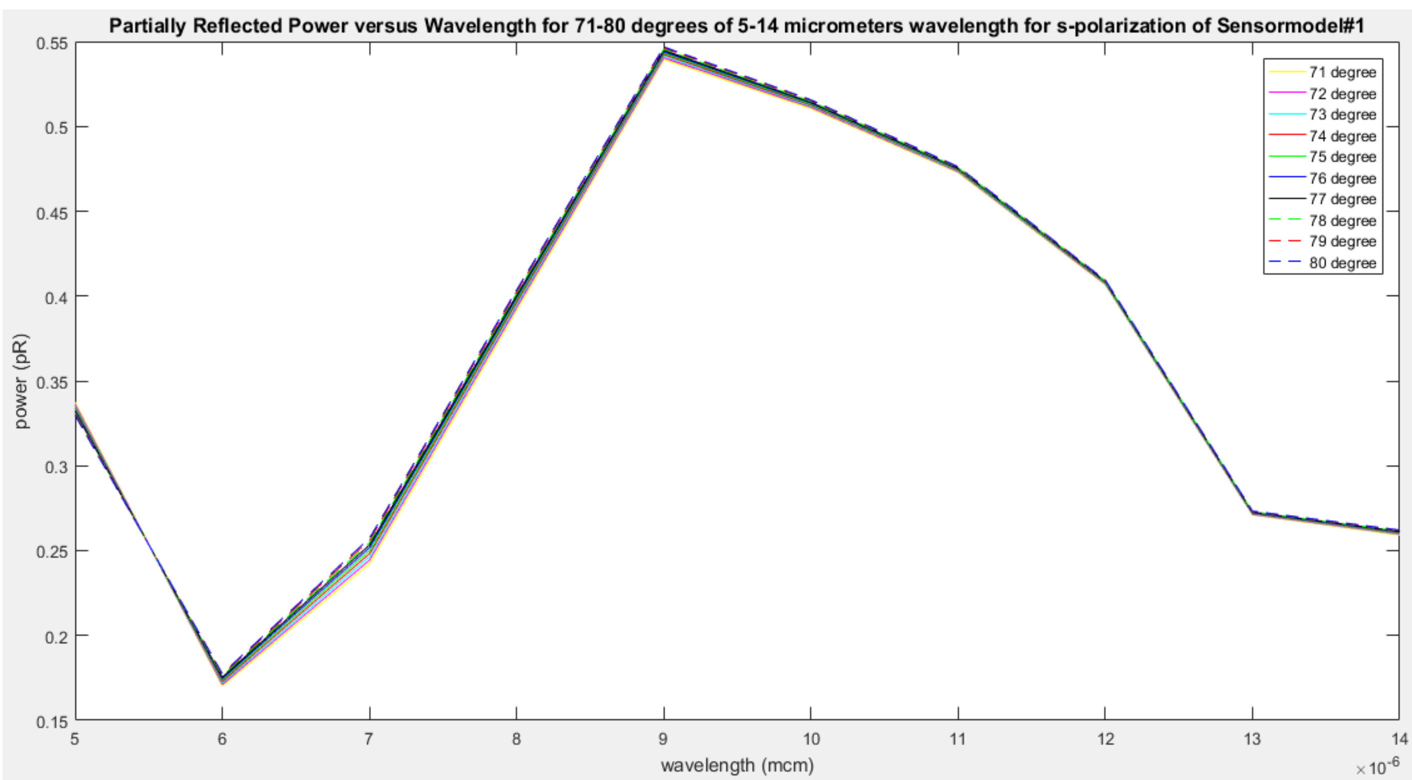


Figure 4-2-8 Partial Reflected Power versus 5-14 μm wavelength for 71-80 degrees of s-polarization

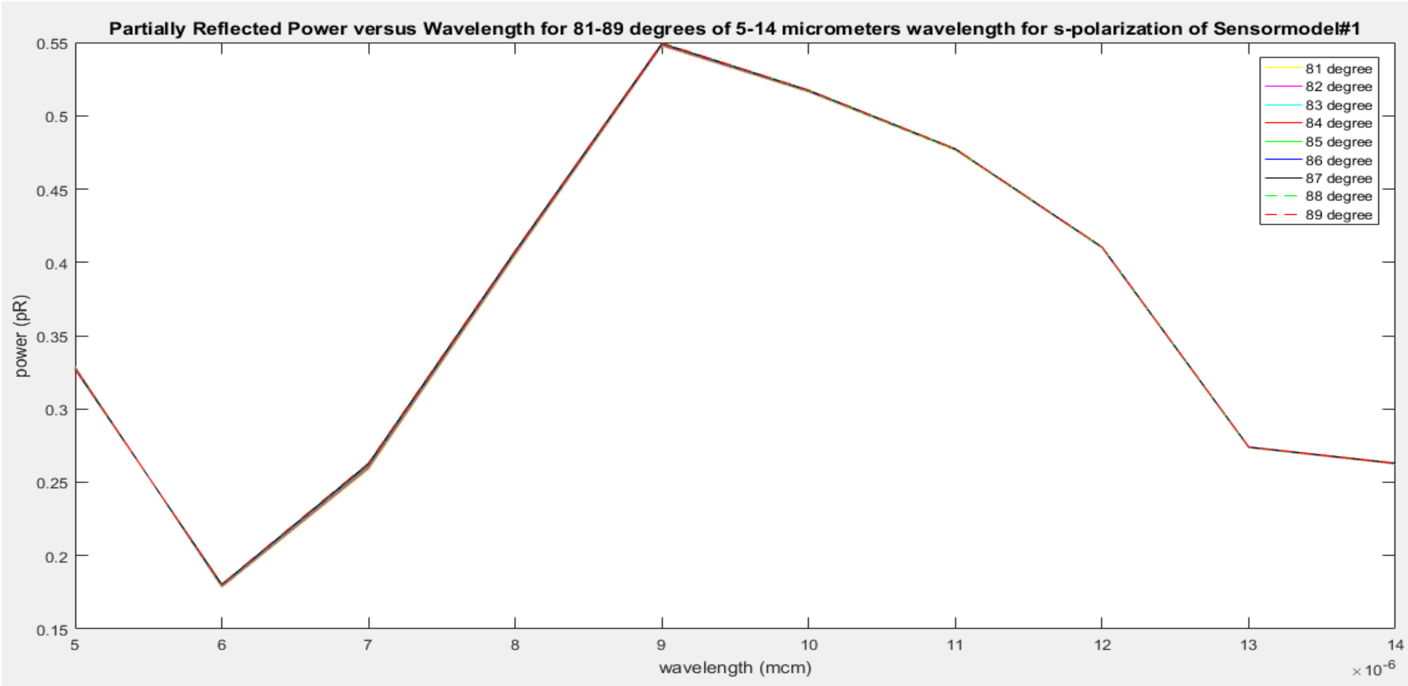


Figure 4-2-9 Partial Reflected Power versus 5-14 µm wavelength for 81-89 degrees of s-polarization

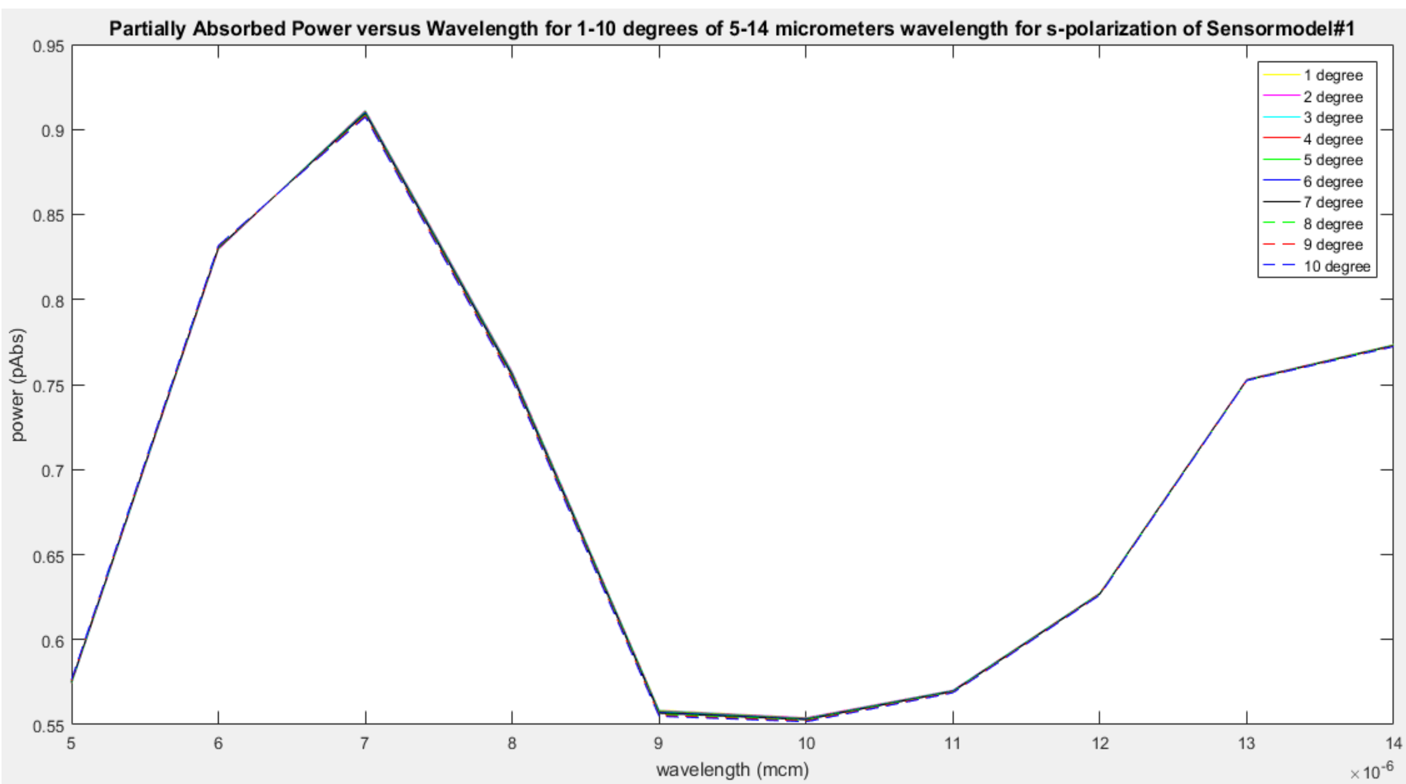


Figure 4-2-10 Partial Absorbed Power versus 5-14 µm wavelength for 1-10 degrees of s-polarization

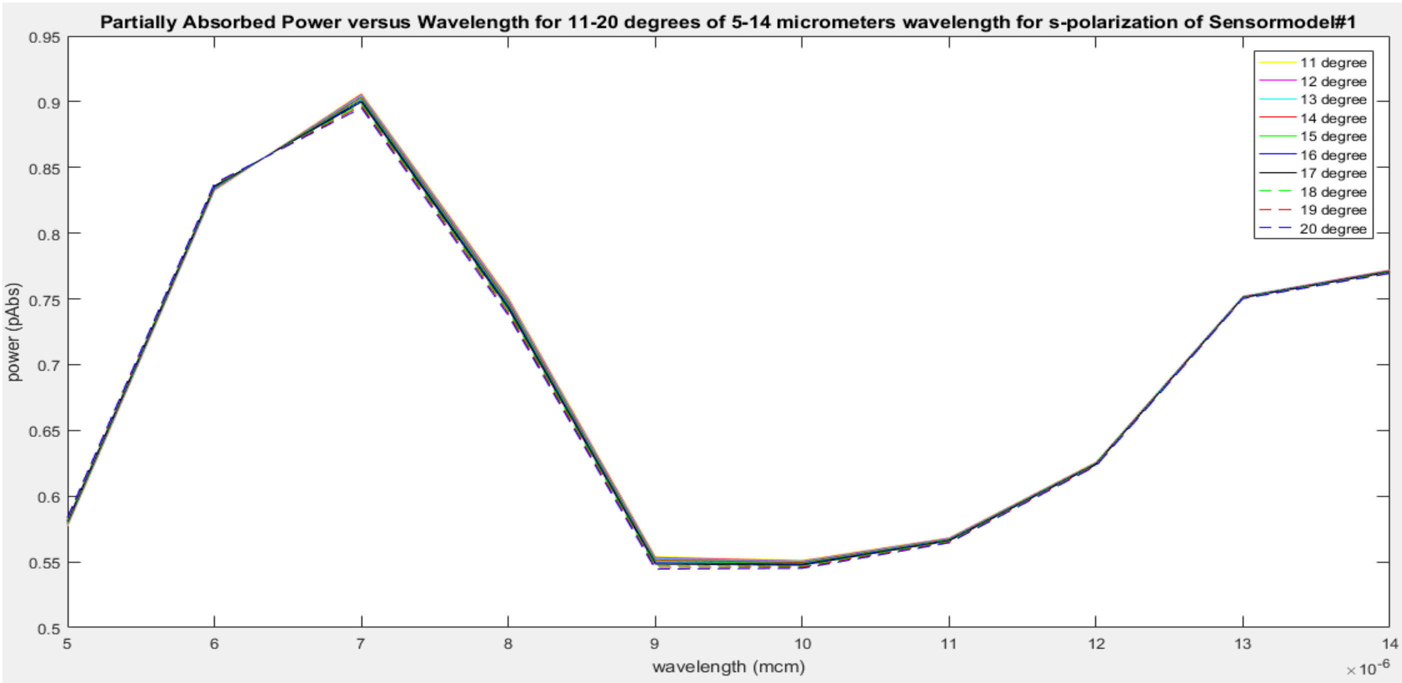


Figure 4-2-11 Partial Absorbed Power versus 5-14 µm wavelength for 11-20 degrees of s-polarization

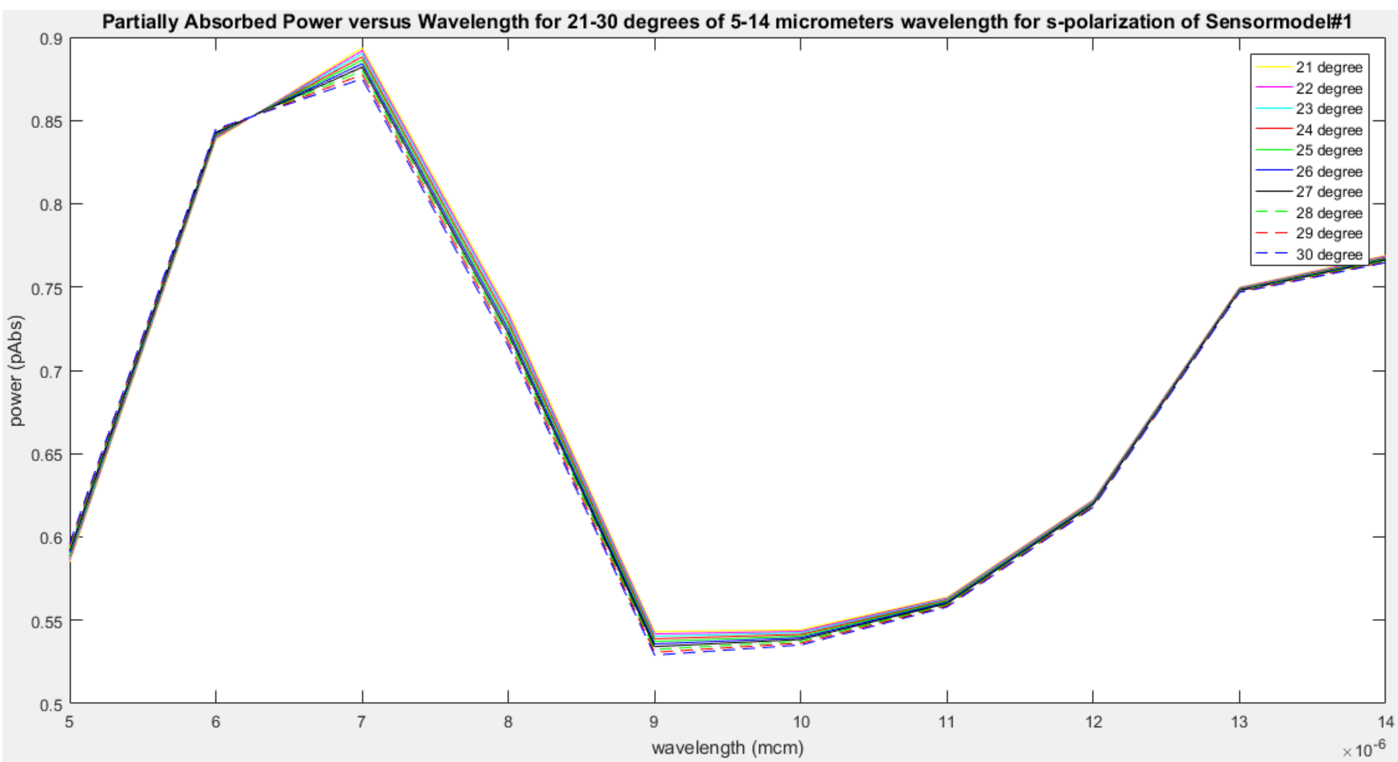


Figure 4-2-12 Partial Absorbed Power versus 5-14 µm wavelength for 21-30 degrees of s-polarization

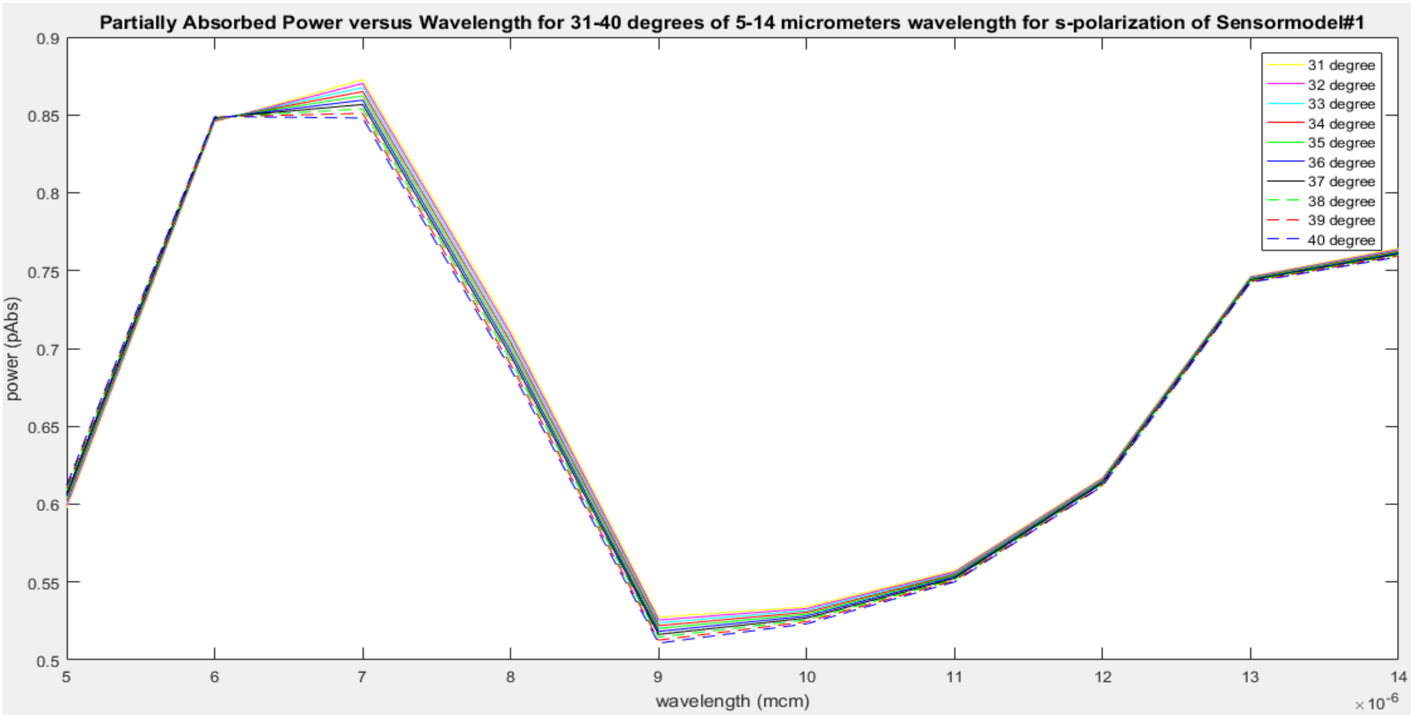


Figure 4-2-13 Partial Absorbed Power versus 5-14 µm wavelength for 31-40 degrees of s-polarization

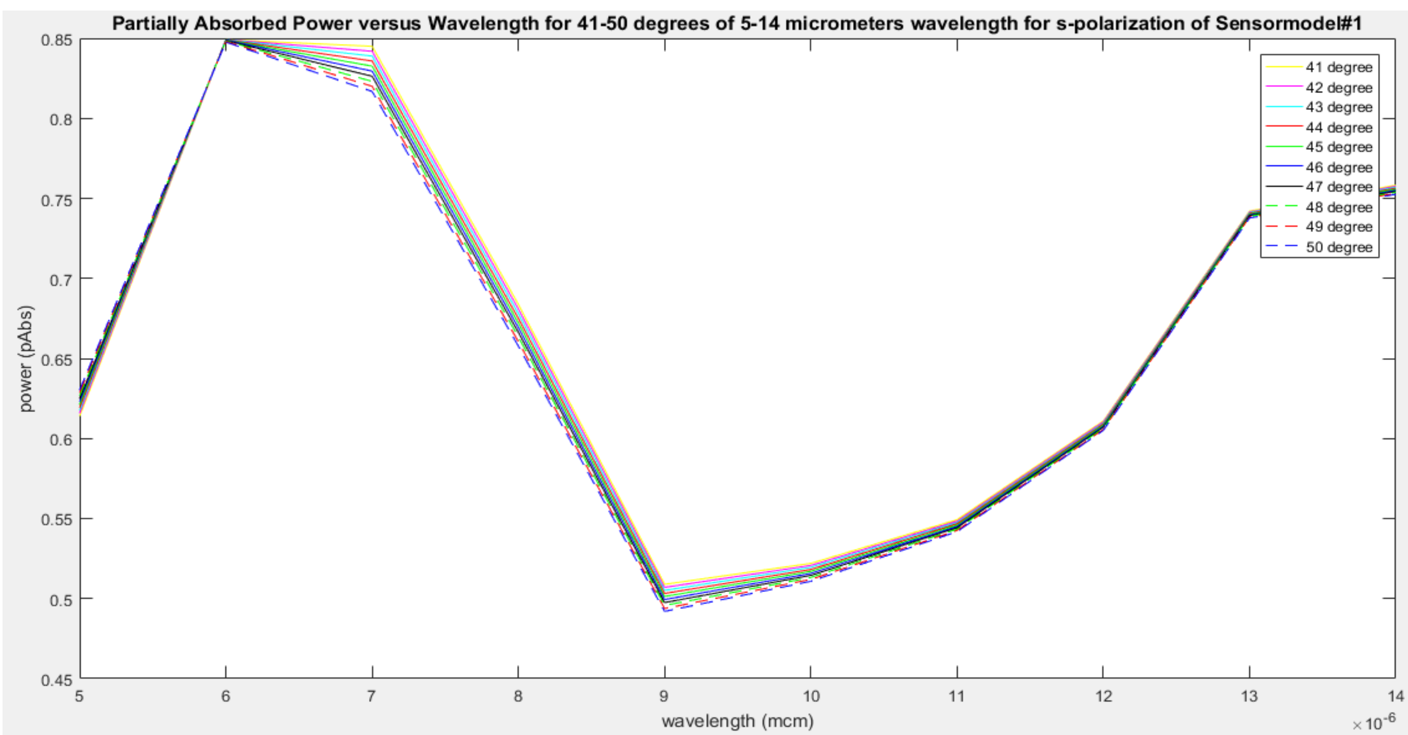


Figure 4-2-14 Partial Absorbed Power versus 5-14 µm wavelength for 41-50 degrees of s-polarization

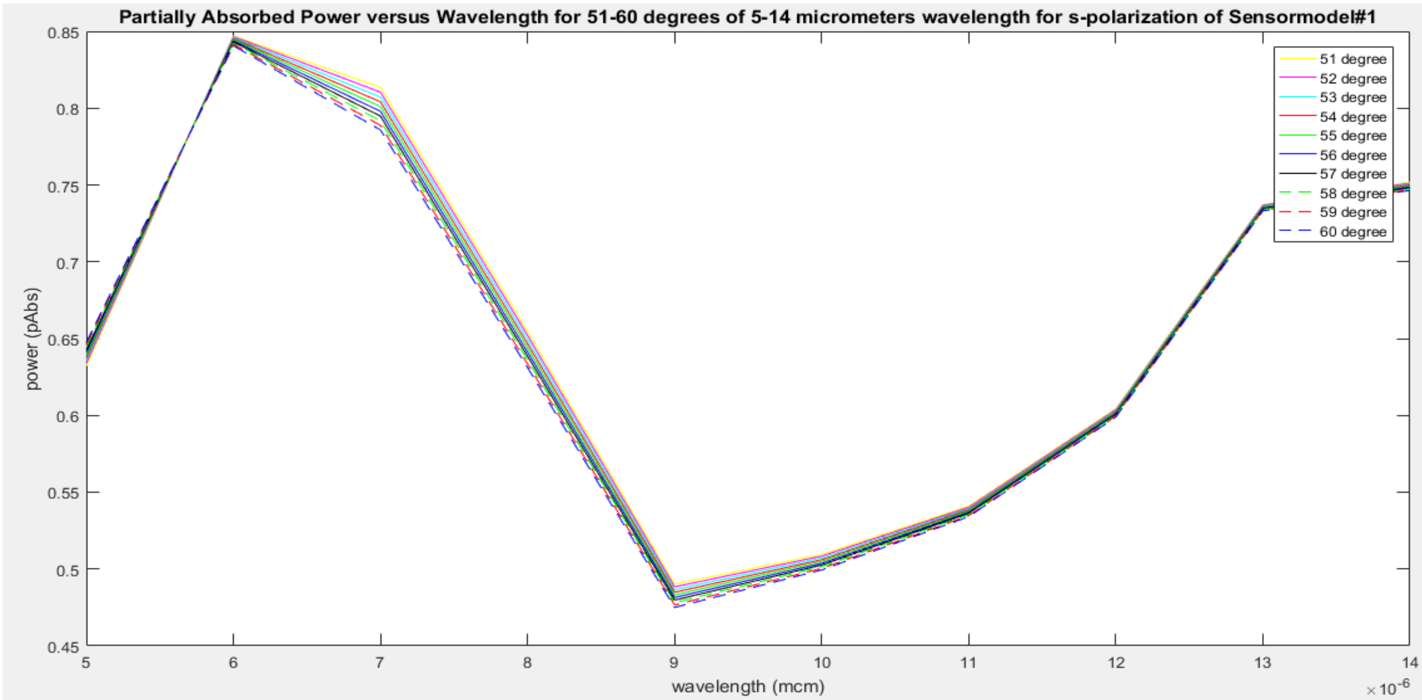


Figure 4-2-15 Partial Absorbed Power versus 5-14 µm wavelength for 51-60 degrees of s-polarization

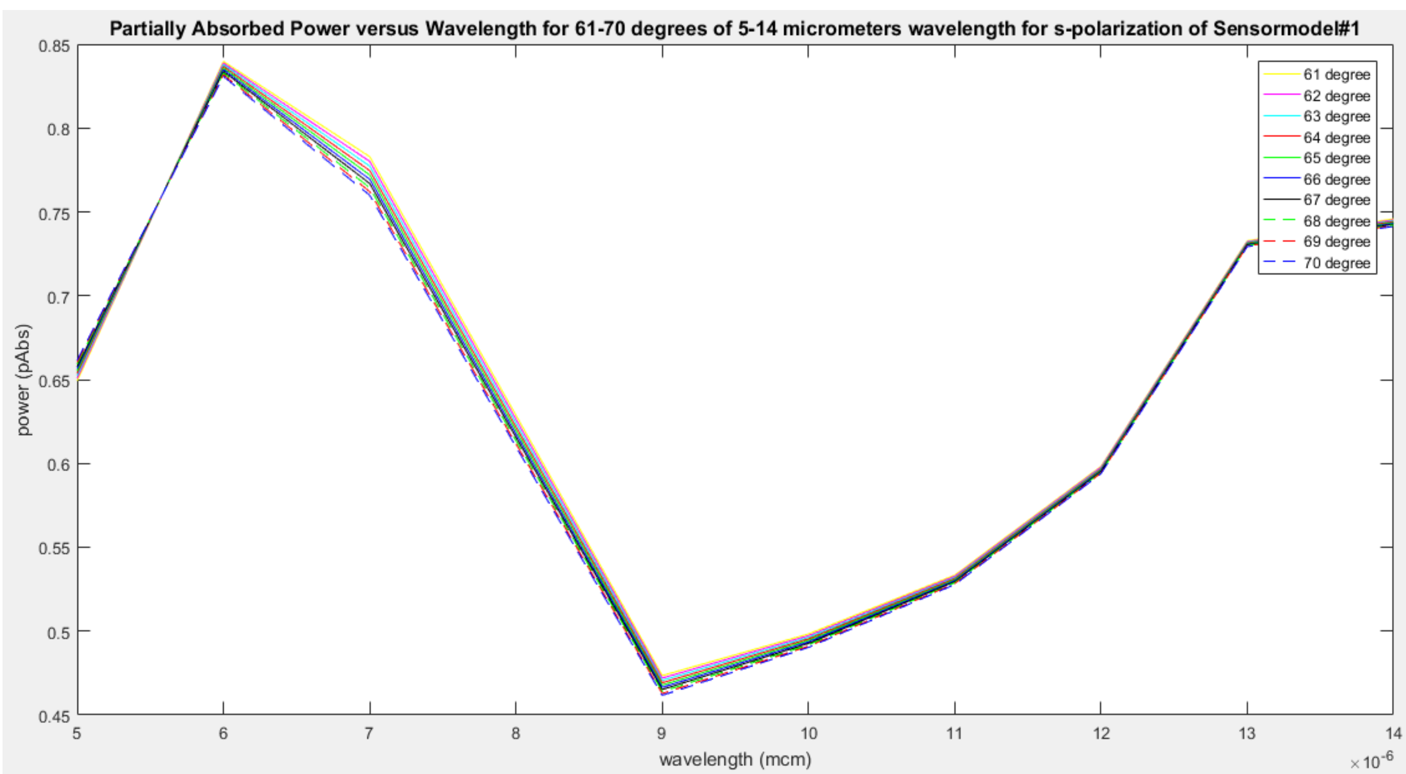


Figure 4-2-16 Partial Absorbed Power versus 5-14 µm wavelength for 61-70 degrees of s-polarization

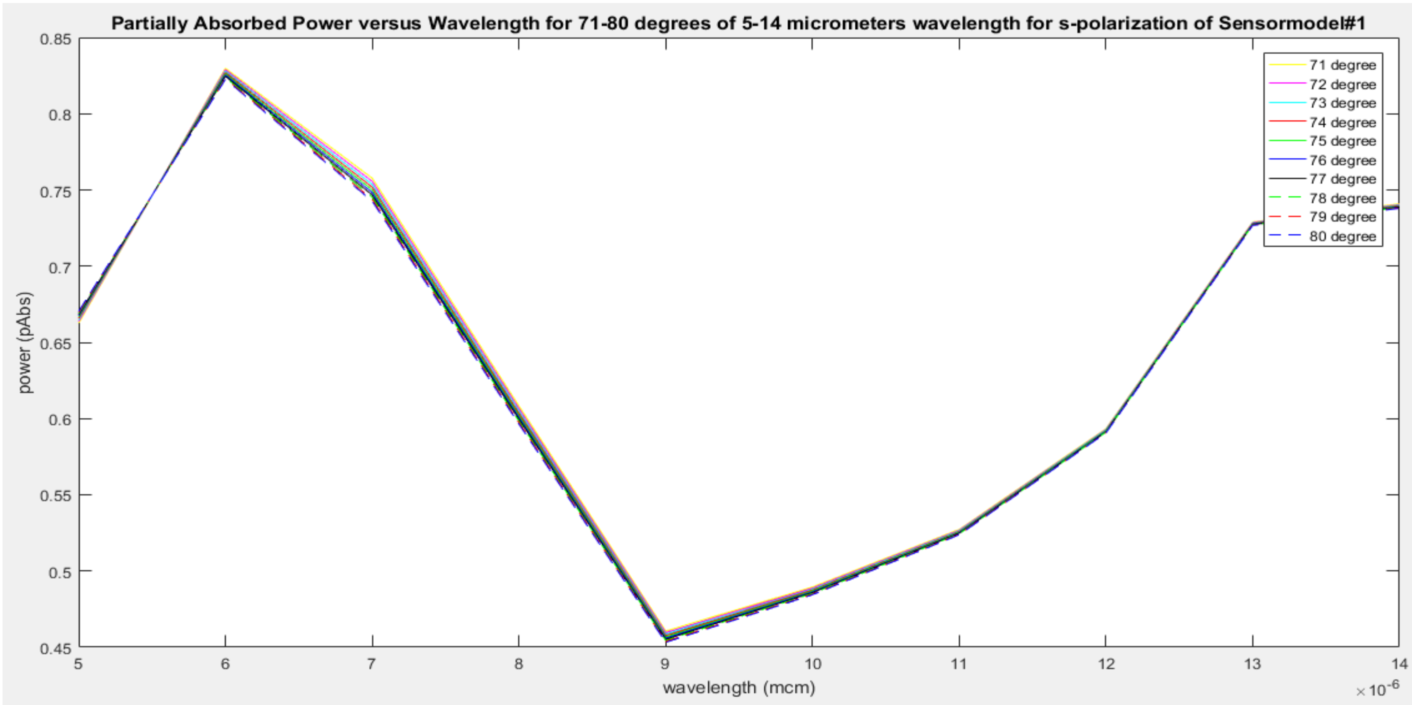


Figure 4-2-17 Partial Absorbed Power versus 5-14 µm wavelength for 71-80 degrees of s-polarization

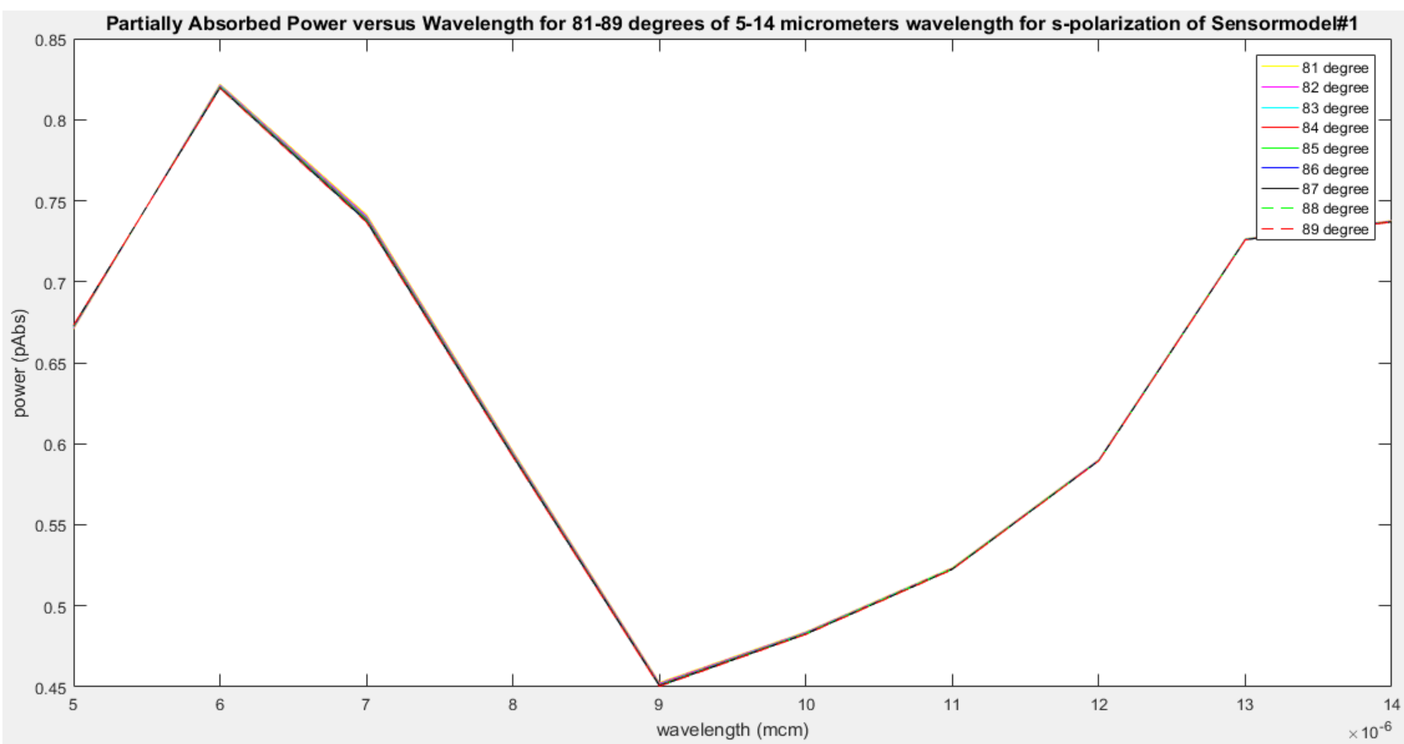


Figure 4-2-18 Partial Absorbed Power versus 5-14 µm wavelength for 81-89 degrees of s-polarization

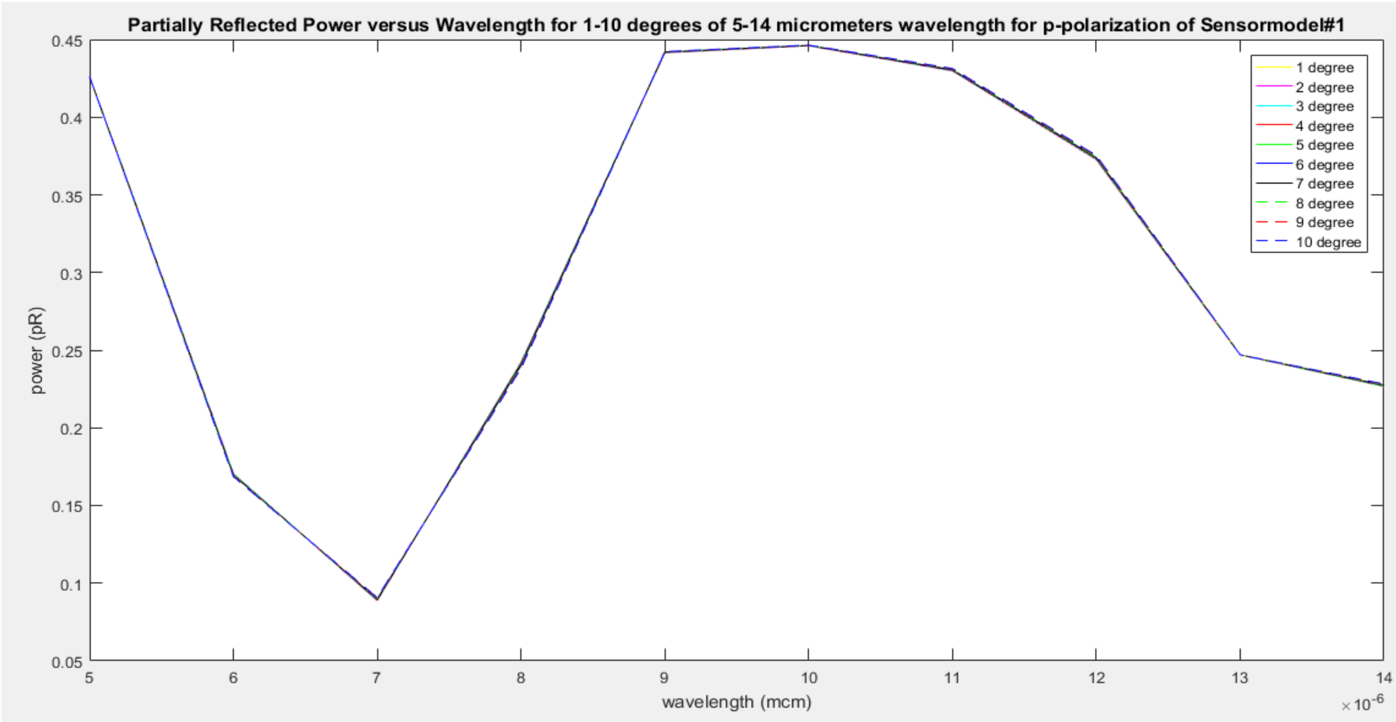


Figure 4-2-19 Partial Reflected Power versus 5-14 μm wavelength for 1-10 degrees of p-polarization

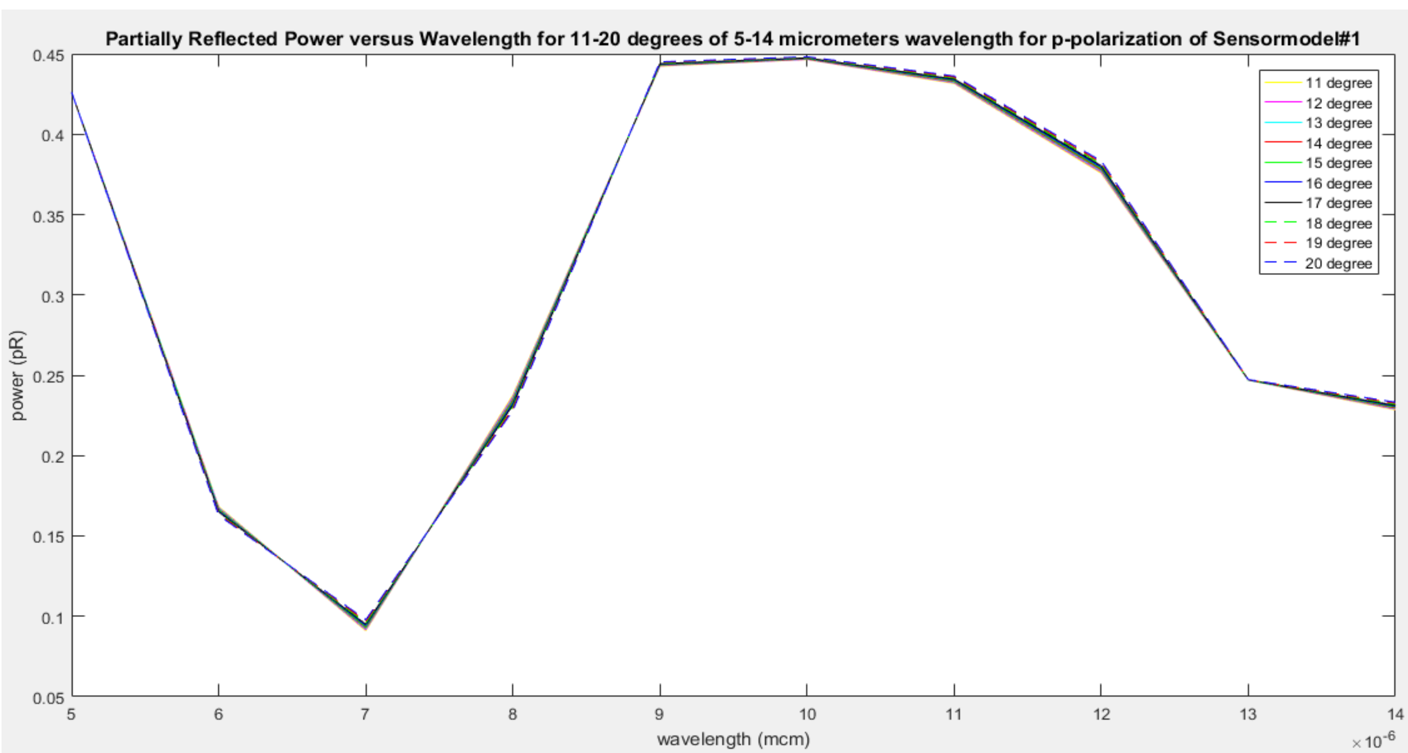


Figure 4-2-20 Partial Reflected Power versus 5-14 μm wavelength for 11-20 degrees of p-polarization

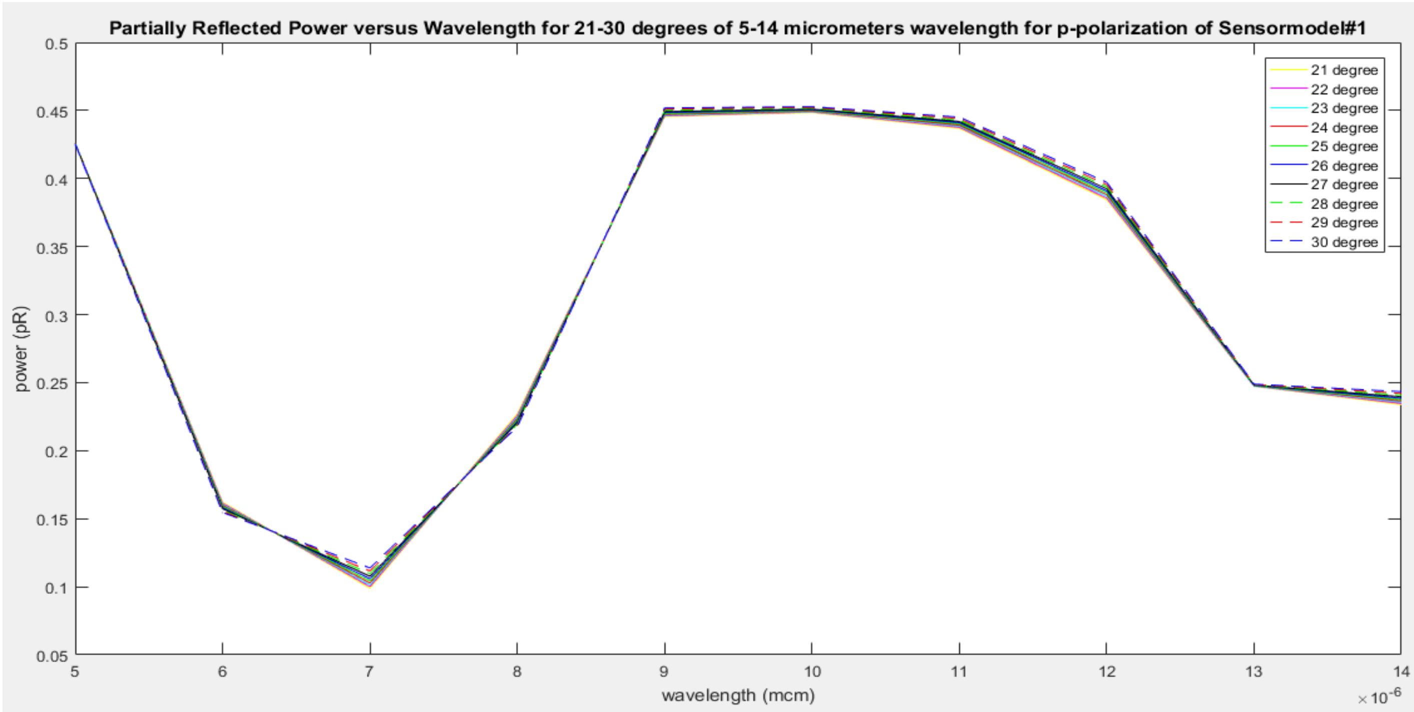


Figure 4-2-21 Partial Reflected Power versus 5-14 µm wavelength for 21-30 degrees of p-polarization

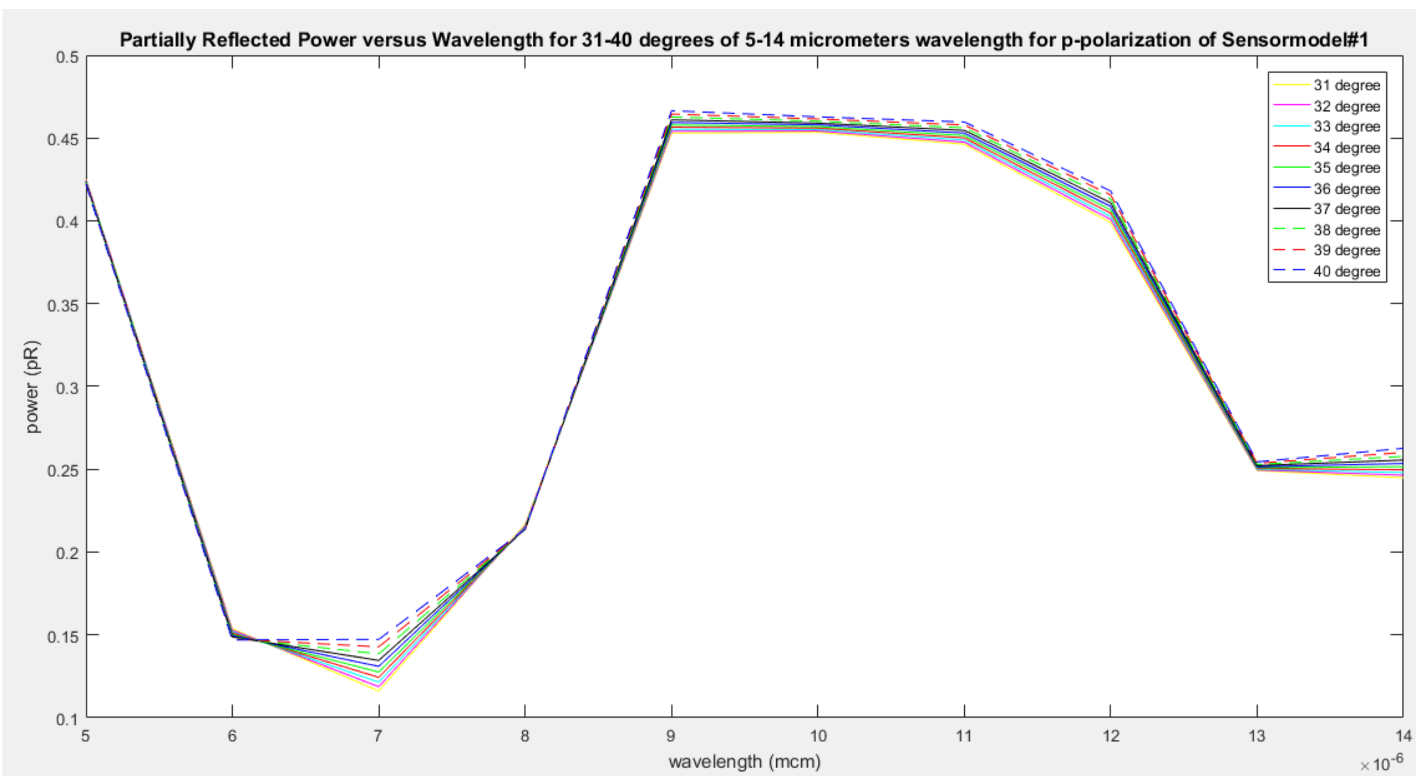


Figure 4-2-22 Partial Reflected Power versus 5-14 µm wavelength for 31-40 degrees of p-polarization

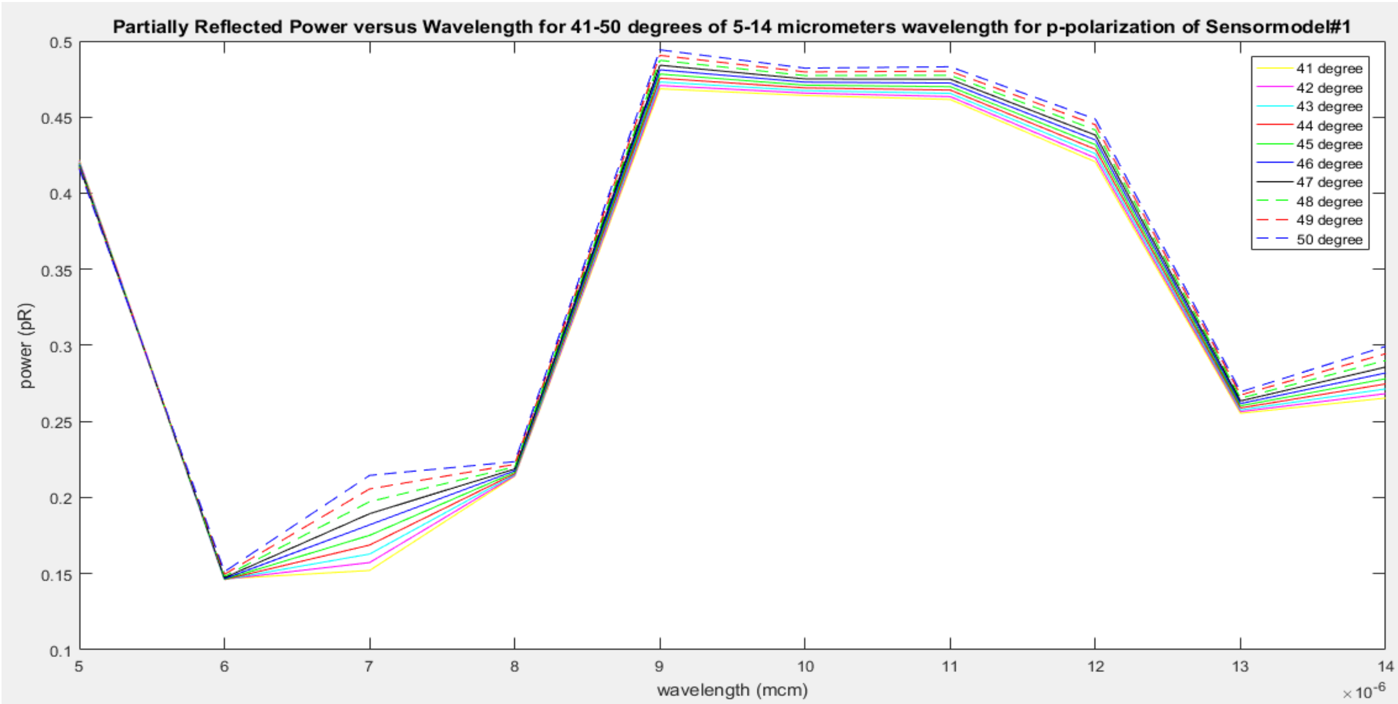


Figure 4-2-23 Partial Reflected Power versus 5-14 µm wavelength for 41-50 degrees of p-polarization

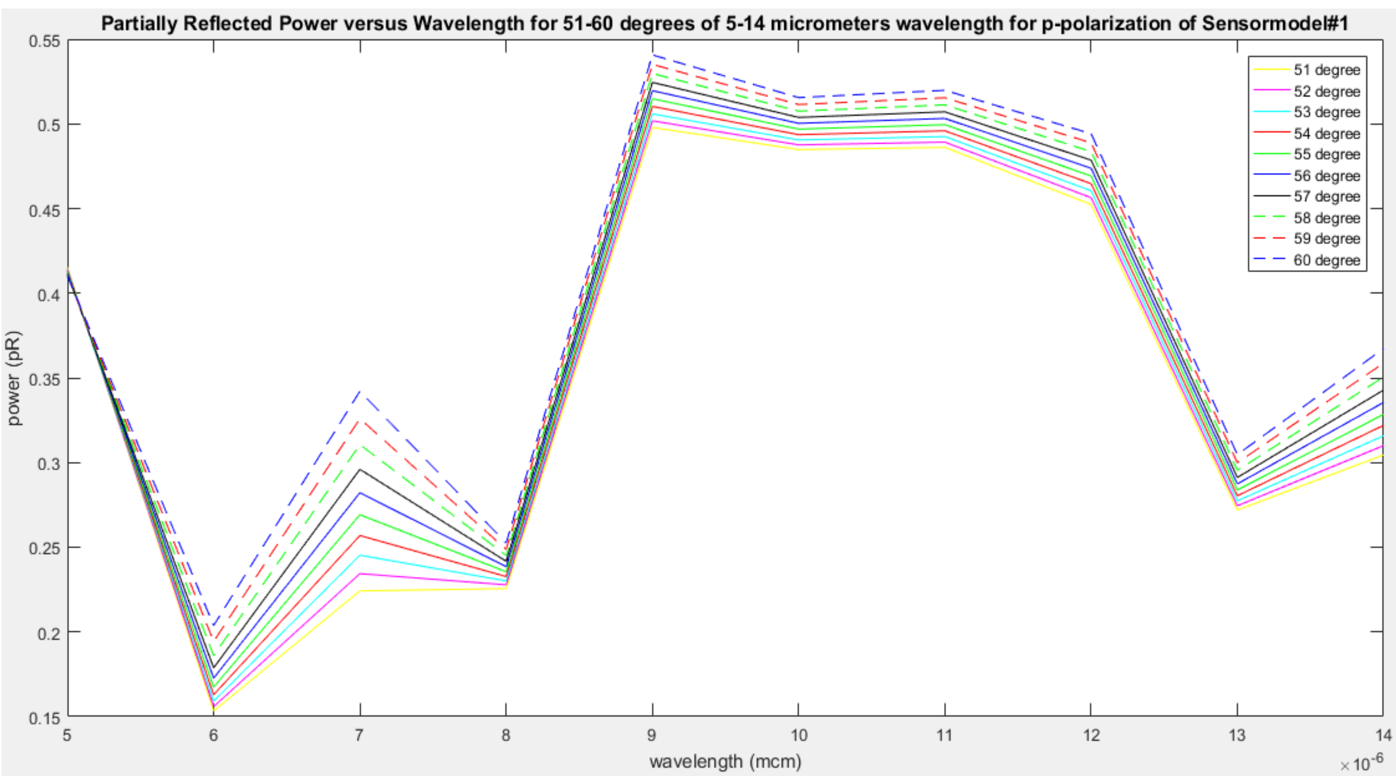


Figure 4-2-24 Partial Reflected Power versus 5-14 µm wavelength for 51-60 degrees of p-polarization

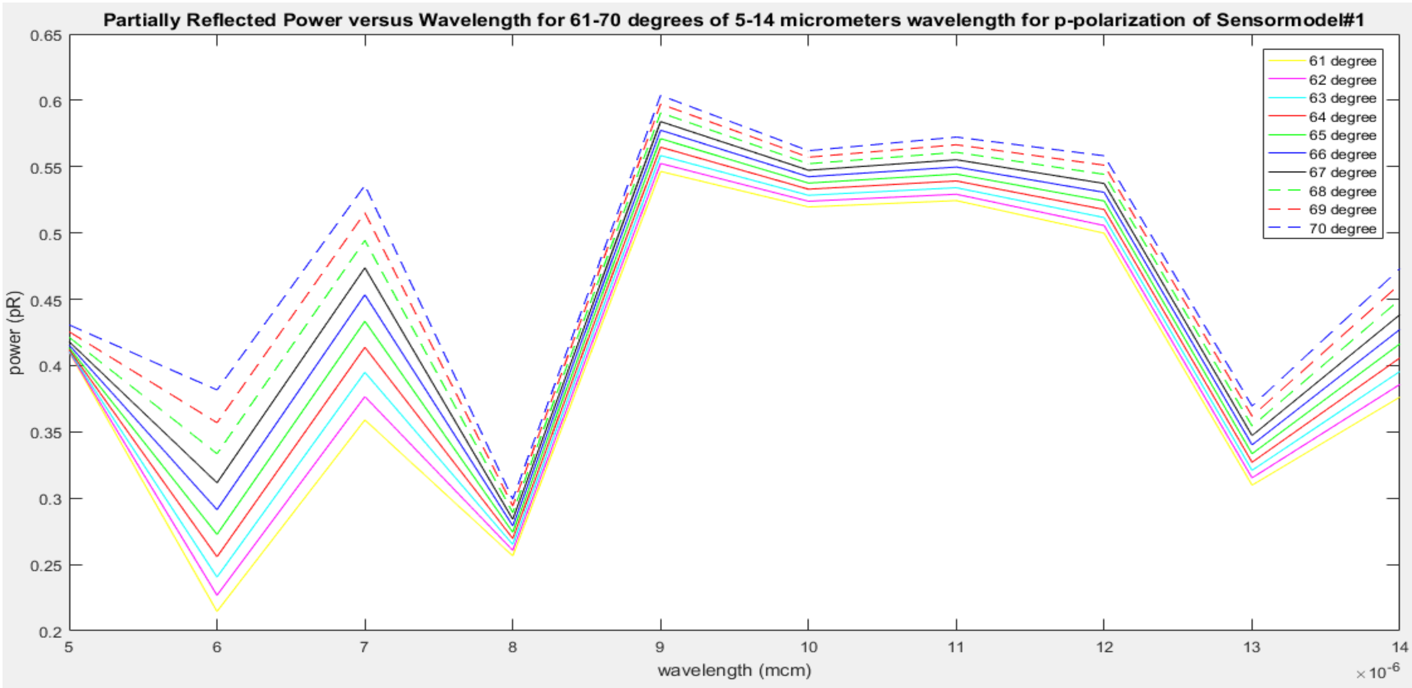


Figure 4-2-25 Partial Reflected Power versus 5-14 µm wavelength for 61-70 degrees of p-polarization

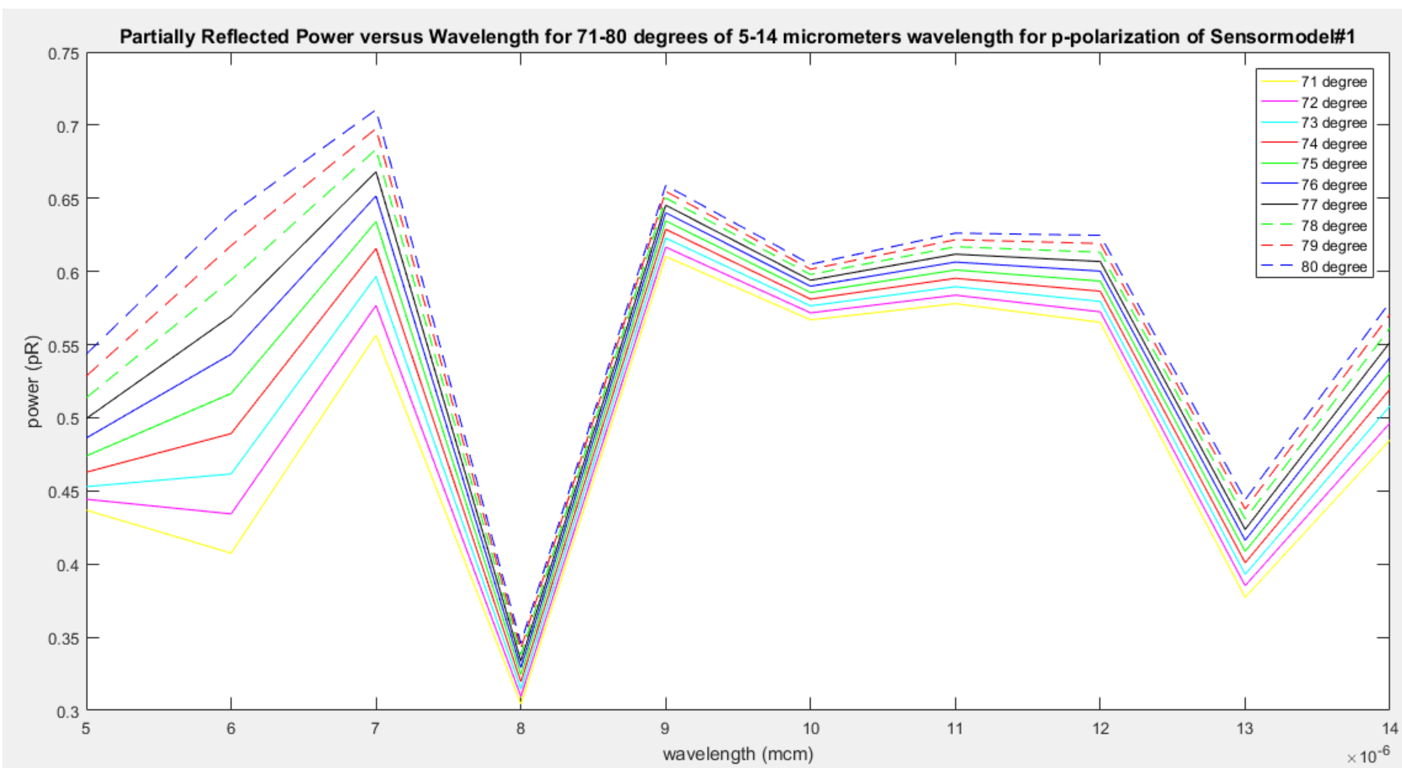


Figure 4-2-26 Partial Reflected Power versus 5-14 µm wavelength for 71-80 degrees of p-polarization

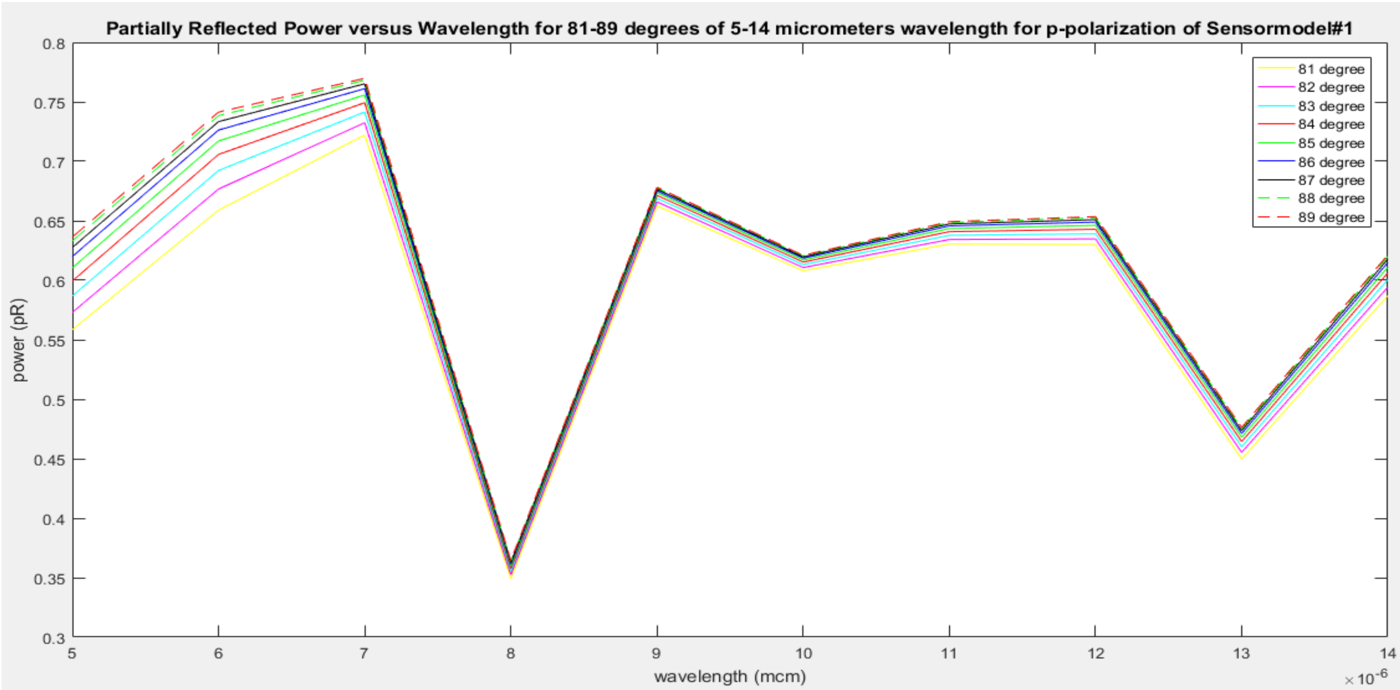


Figure 4-2-27 Partial Reflected Power versus 5-14 µm wavelength for 81-89 degrees of p-polarization

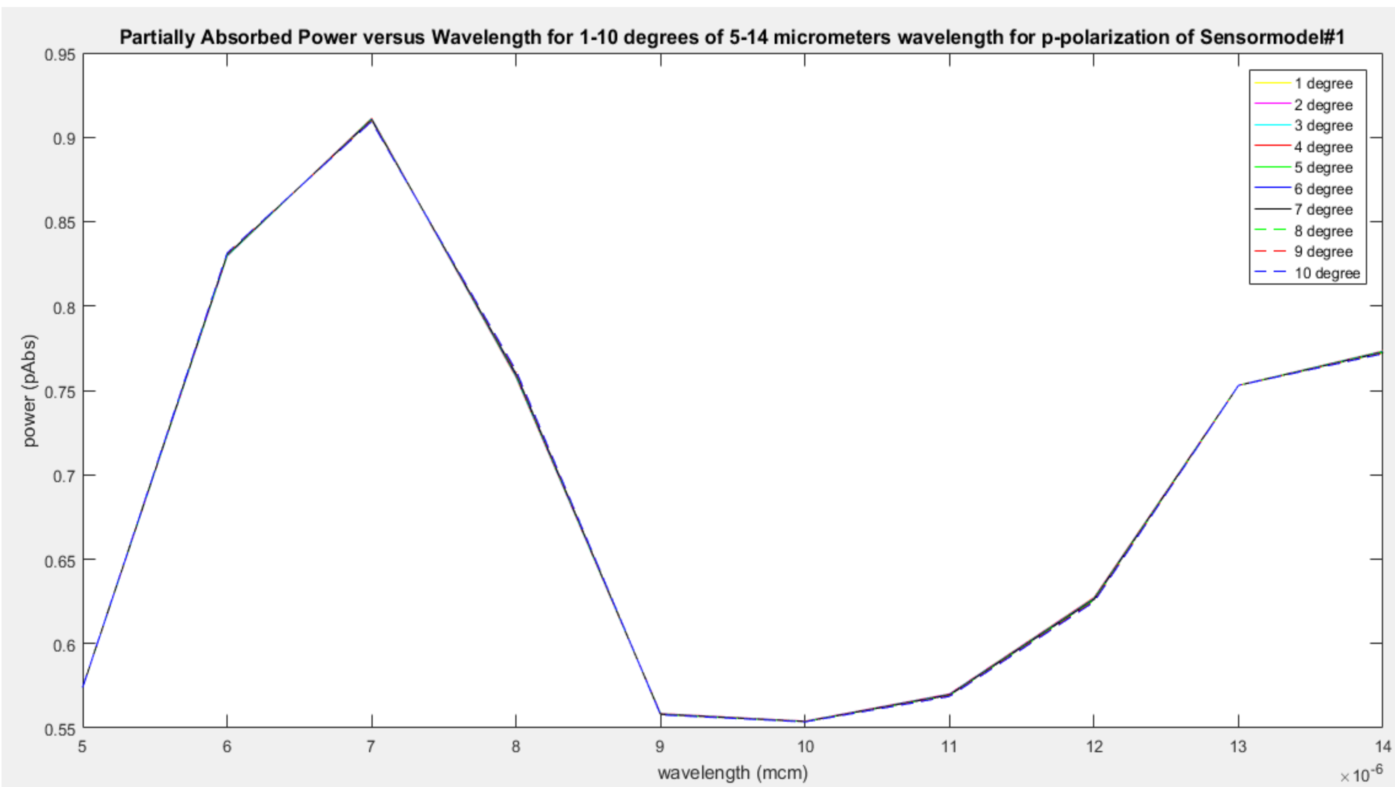


Figure 4-2-28 Partial Absorbed Power versus 5-14 µm wavelength for 1-10 degrees of p-polarization

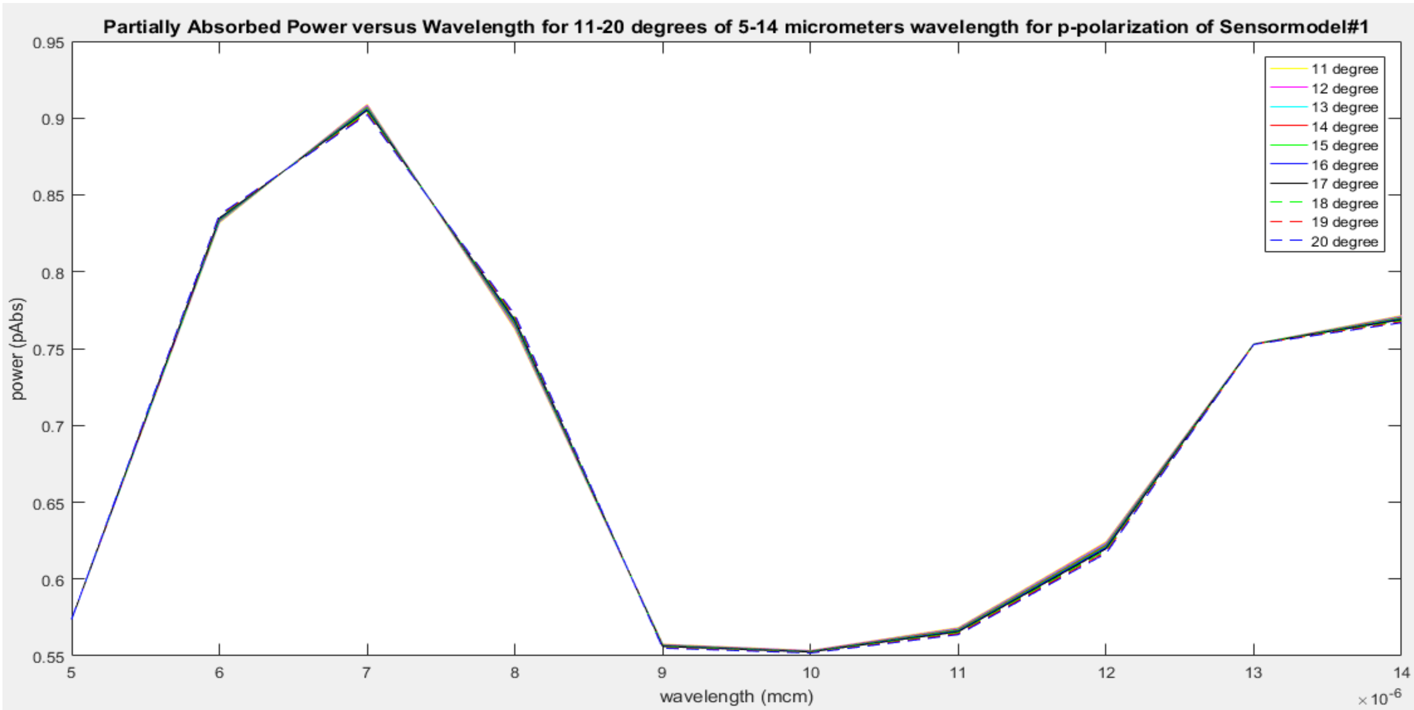


Figure 4-2-29 Partial Absorbed Power versus 5-14 µm wavelength for 11-20 degrees of p-polarization

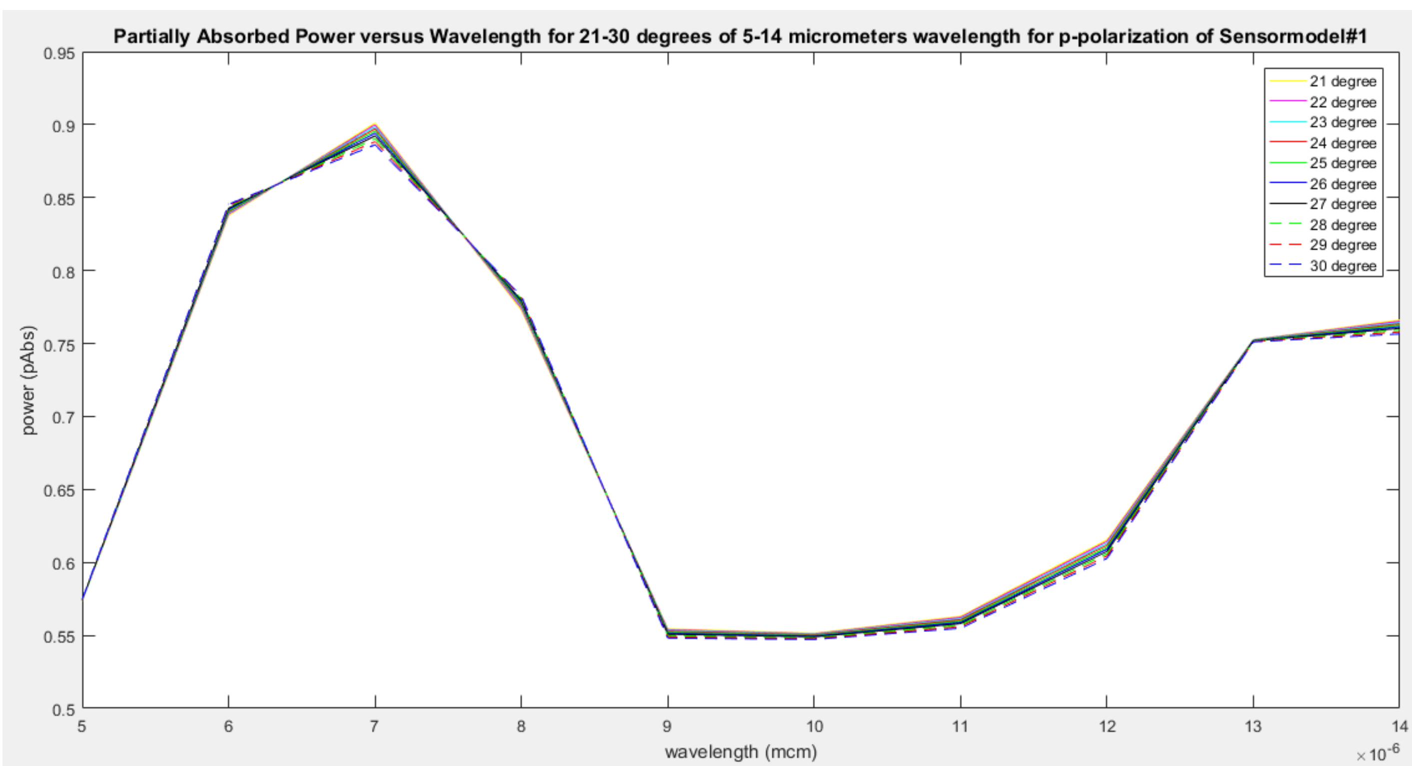


Figure 4-2-30 Partial Absorbed Power versus 5-14 µm wavelength for 21-30 degrees of p-polarization

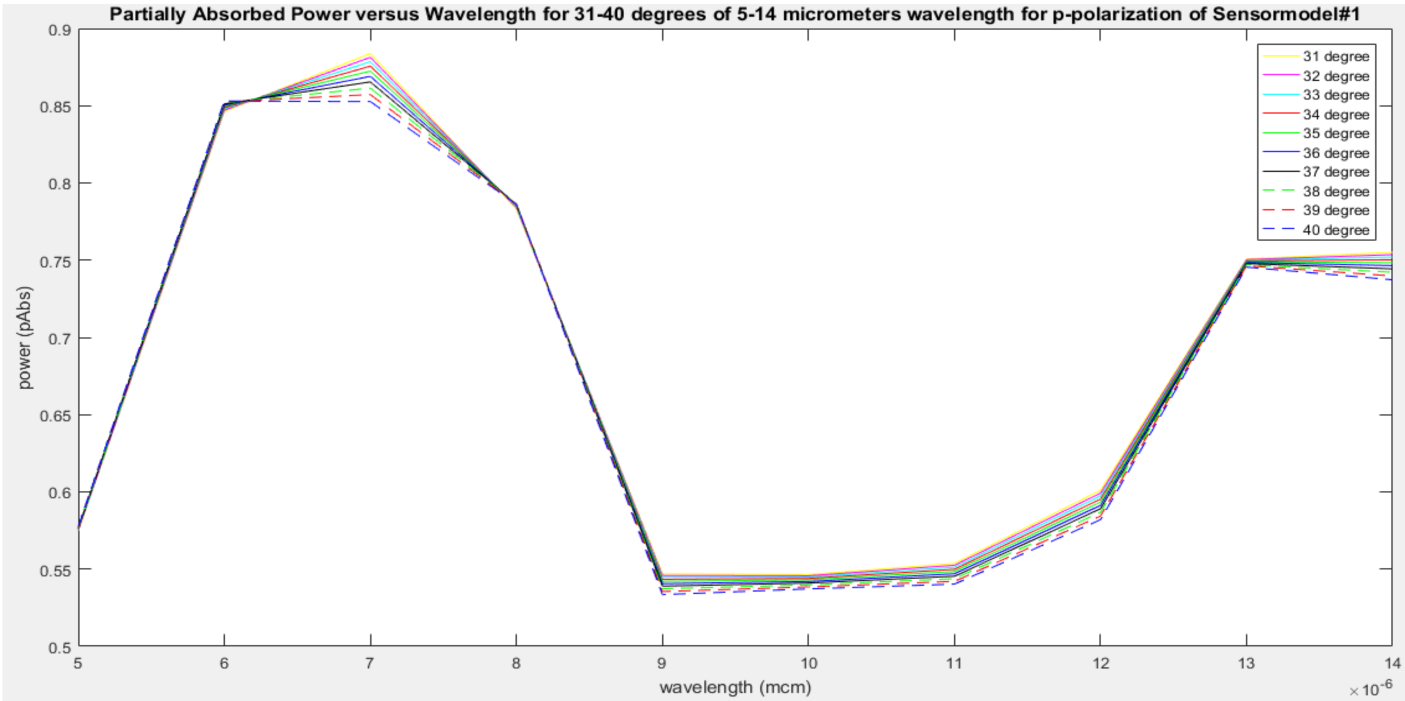


Figure 4-2-31 Partial Absorbed Power versus 5-14 µm wavelength for 31-40 degrees of p-polarization

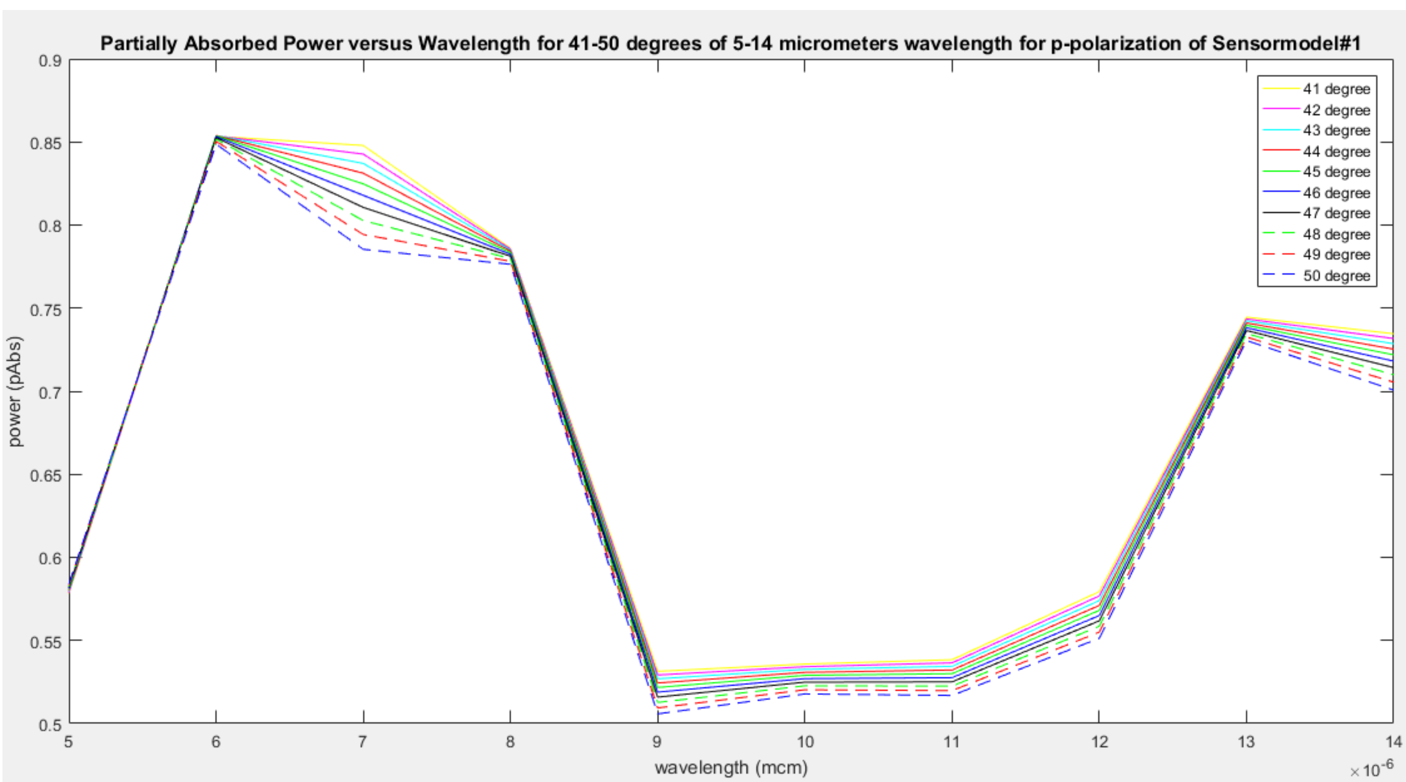


Figure 4-2-32 Partial Absorbed Power versus 5-14 µm wavelength for 41-50 degrees of p-polarization

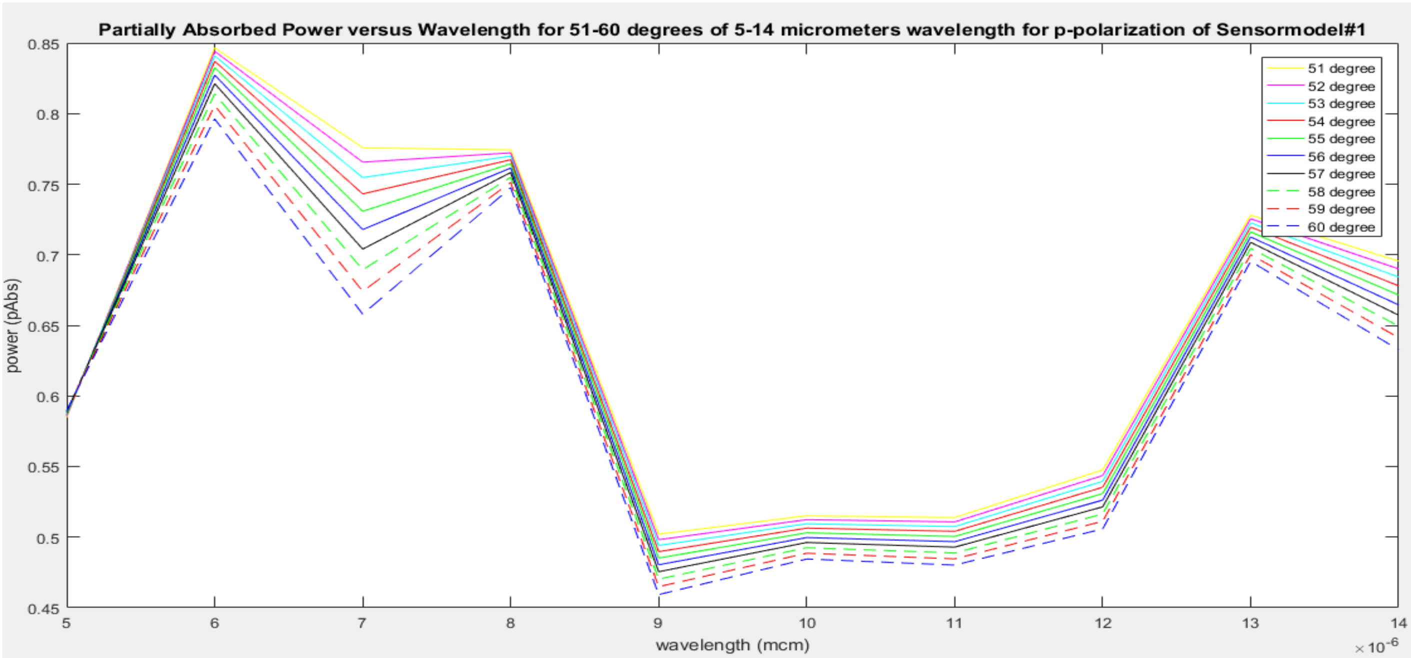


Figure 4-2-33 Partial Absorbed Power versus 5-14 µm wavelength for 51-60 degrees of p-polarization

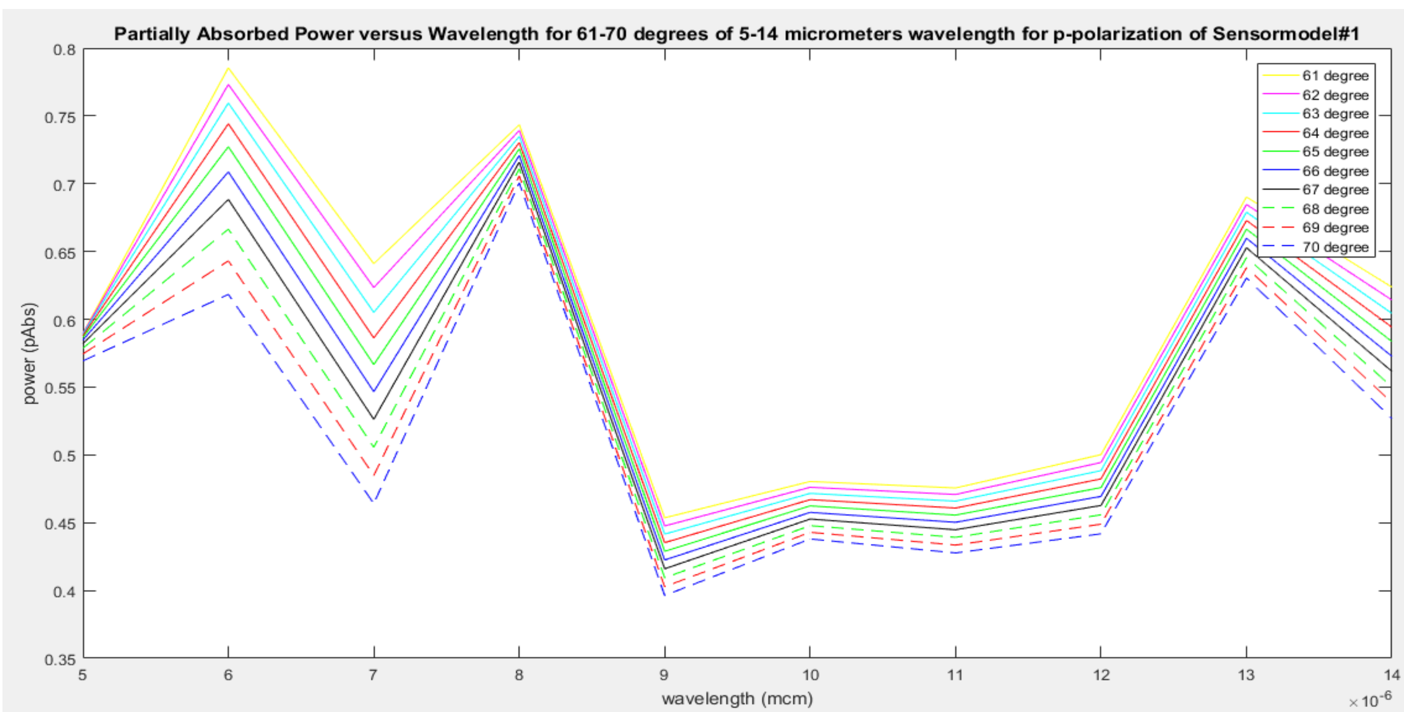


Figure 4-2-34 Partial Absorbed Power versus 5-14 µm wavelength for 61-70 degrees of p-polarization

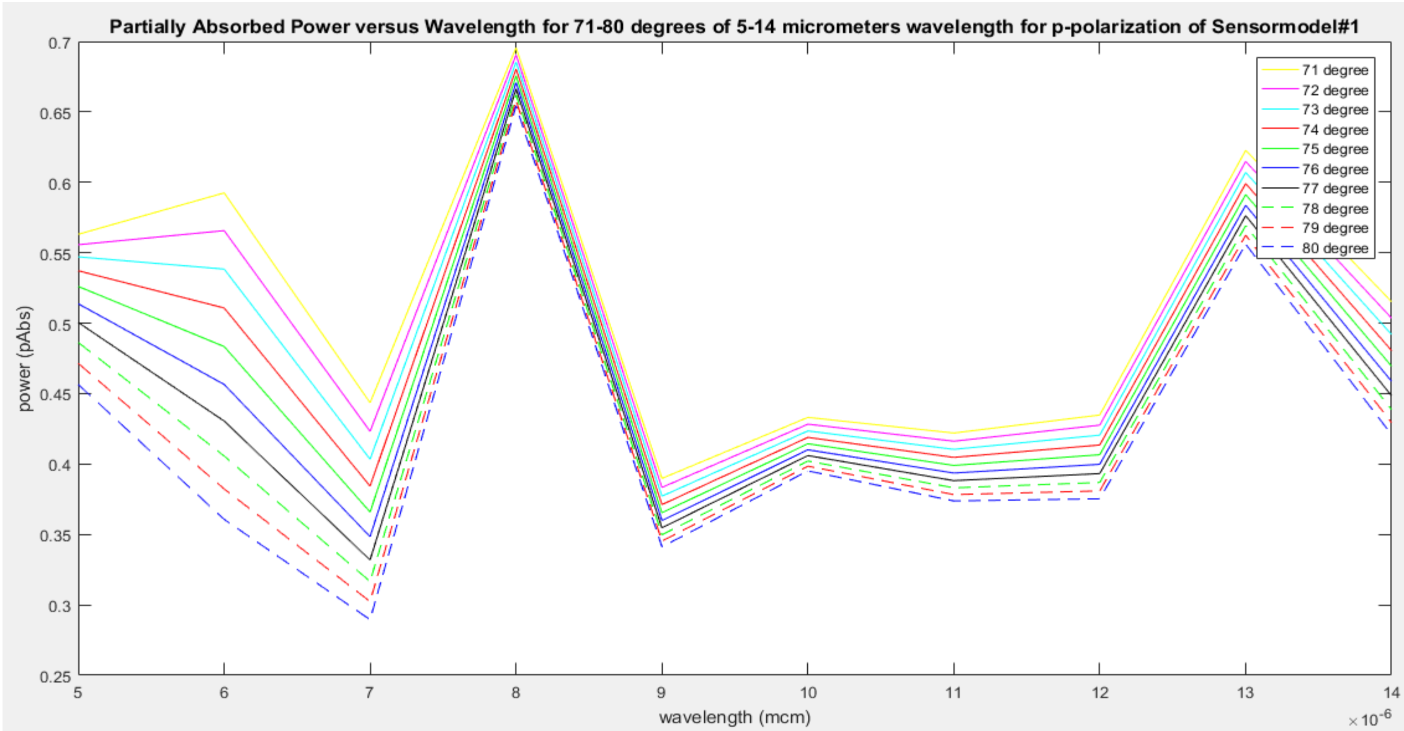


Figure 4-2-35 Partial Absorbed Power versus 5-14 µm wavelength for 71-80 degrees of p-polarization

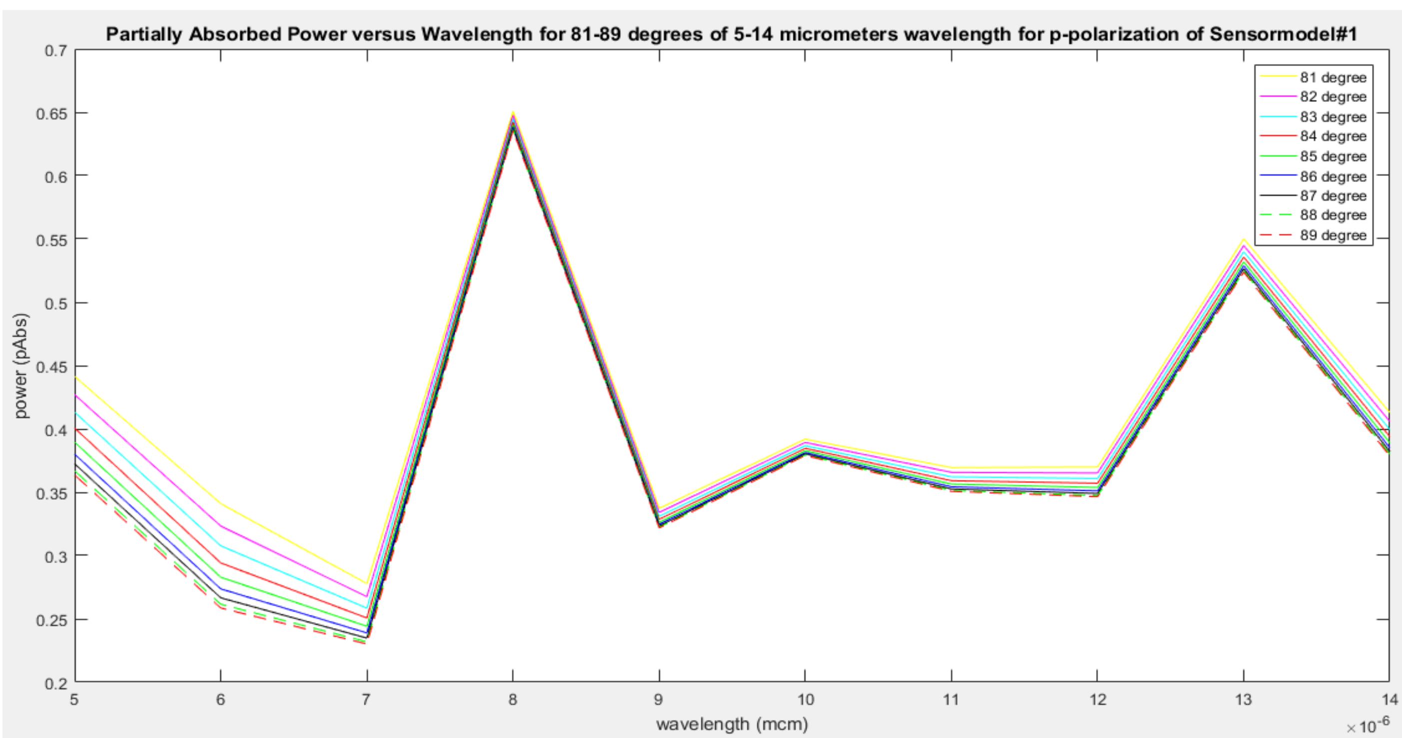


Figure 4-2-36 Partial Absorbed Power versus 5-14 µm wavelength for 81-89 degrees of p-polarization

4.2.1 Discussions

Table 4-2-1 comparison of maximum reflected power values at respective angles on incidence for s and p polarization across wavelengths of 5-14 µm

Wavelength	Pr values of current model at oblique incidence (s-polarization) – Highest value	Pr values of current model at oblique incidence (s-polarization) – Least value
5 µm	0.4259 → 1^0	0.3268 → 89^0
6 µm	0.1807 → 89^0	0.1508 → 42^0, 43^0
7 µm	0.2633 → 89^0	0.0888 → 1^0
8 µm	0.4082 → 89^0	0.2425 → 1^0
9 µm	0.5497 → 89^0	0.4415 → 1^0
10 µm	0.5176 → 89^0	0.4460 → 1^0, 2^0
11 µm	0.4776 → 89^0	0.4298 → 1^0, 2^0
12 µm	0.4106 → 89^0	0.3726 → 1^0
13 µm	0.2742 → 89^0	0.2470 → 1^0, 2^0
14 µm	0.2632 → 88^0, 89^0	0.2266 → 1^0

Table 4-2-2 comparison of minimum and maximum partial reflected power values at respective angles on incidence for p polarization across wavelengths of 5-14 µm

Wavelength	Pr values of current model at oblique incidence (p-polarization) – Highest value	Pr values of current model at oblique incidence (p-polarization) – Least value
5 µm	0.6364 → 89^0	0.4102 → 60^0, 61^0
6 µm	0.7414 → 89^0	0.1461 → 43^0, 44^0

7 µm	0.7698 → 89^0	0.0887 → 1^0
8 µm	0.3644 → 89^0	0.2136 → 38^0, 39^0
9 µm	0.6782 → 89^0	0.4415 → 1^0, 2^0
10 µm	0.6210 → 89^0	0.4460 → 1^0, 2^0, 3^0, 4^0
11 µm	0.6493 → 89^0	0.4298 → 1^0, 2^0
12 µm	0.6535 → 89^0	0.3726 → 1^0
13 µm	0.4763 → 89^0	0.2470 → 1^0 to 15^0
14 µm	0.6214 → 89^0	0.2266 → 1^0

Table 4-2-3 comparison of minimum and maximum partial absorbed power values at respective angles on incidence for s polarization across wavelengths of 5-14 µm

Wavelength	Pabs values of current model at oblique incidence (s-polarization) – Highest value	Pabs values of current model at oblique incidence (s-polarization) – Least value
5 µm	0.6732 - 0.0000i → 89^0	0.5741 - 0.0000i → 1^0, 2^0
6 µm	0.8492 - 0.0000i → 42^0, 43^0	0.8193 - 0.0000i → 89^0
7 µm	0.9112 - 0.0000i → 1^0	0.7367 - 0.0000i → 89^0
8 µm	0.7575 - 0.0000i → 1^0	0.5918 - 0.0000i → 89^0
9 µm	0.5585 - 0.0000i → 1^0	0.4503 - 0.0000i → 89^0
10 µm	0.5540 - 0.0000i → 1^0, 2^0	0.4824 - 0.0000i → 89^0
11 µm	0.5702 - 0.0000i → 1^0, 2^0	0.5224 - 0.0000i → 89^0
12 µm	0.6274 - 0.0000i → 1^0	0.5894 - 0.0000i → 89^0
13 µm	0.7530 - 0.0000i → 1^0, 2^0	0.7258 - 0.0000i → 89^0
14 µm	0.7734 - 0.0000i → 1^0	0.7368 - 0.0000i → 88^0, 89^0

Table 4-2-4 comparison of minimum and maximum partial absorbed power values at respective angles on incidence for p polarization across wavelengths of 5-14 µm

Wavelength	Pabs values of current model at oblique incidence (p-polarization) – Highest value	Pabs values of current model at oblique incidence (p-polarization) – Least value
5 µm	0.5898 - 0.0000i → 60^0 , 61^0	0.3636 - 0.0000i → 89^0
6 µm	0.8539 - 0.0000i → 43^0, 44^0	0.2586 - 0.0000i → 89^0
7 µm	0.9113 - 0.0000i → 1^0	0.2302 - 0.0000i → 89^0
8 µm	0.7864 - 0.0000i → 38^0, 39^0	0.6356 - 0.0000i → 89^0
9 µm	0.5585 - 0.0000i → 1^0, 2^0	0.3218 - 0.0000i → 89^0
10 µm	0.5540 - 0.0000i → 1^0 to 4^0	0.3790 - 0.0000i → 89^0
11 µm	0.5702 - 0.0000i → 1^0	0.3507 - 0.0000i → 89^0
12 µm	0.6274 - 0.0000i → 1^0	0.3465 - 0.0000i → 89^0
13 µm	0.7530 - 0.0000i → 1^0 to 15^0	0.5237 - 0.0000i → 89^0
14 µm	0.7734 - 0.0000i → 1^0	0.3786 - 0.0000i → 89^0

For s-polarization we observed that the minimum magnitude of the power absorbed is 0.4503-0.0000i at 89^0 for wavelength of 9 µm. For s-polarization a magnitude of minimum absorbed power that is below 50% is observed just for wavelengths of 9 µm and 10 µm. For p-polarization we observe that the minimum magnitude of power absorbed is 0.2302-0.0000i at 89^0 for wavelength of 7 µm. For p-polarization a magnitude of minimum absorbed power that is below 50% is observed for wavelengths of 5-7 µm and 9-12 µm. In case of both s and p polarization we observe that the maximum values are the same for wavelength range from 9-14 µm, although the angle of incidence at which they are occurring are different for the same wavelengths. In both s and p polarization magnitude of maximum absorbed power exceeds 50% for all wavelengths from 5-14 µm. In case of normal incidence of the patent, the inventors have suggested that there is more than 50% absorbance for wavelength range of 7 to 14 μm. From the design point of view we are changing the reflector material to Al. In the original patent the reflector material was TiW.

4.3 Results for Sensor Structure 2

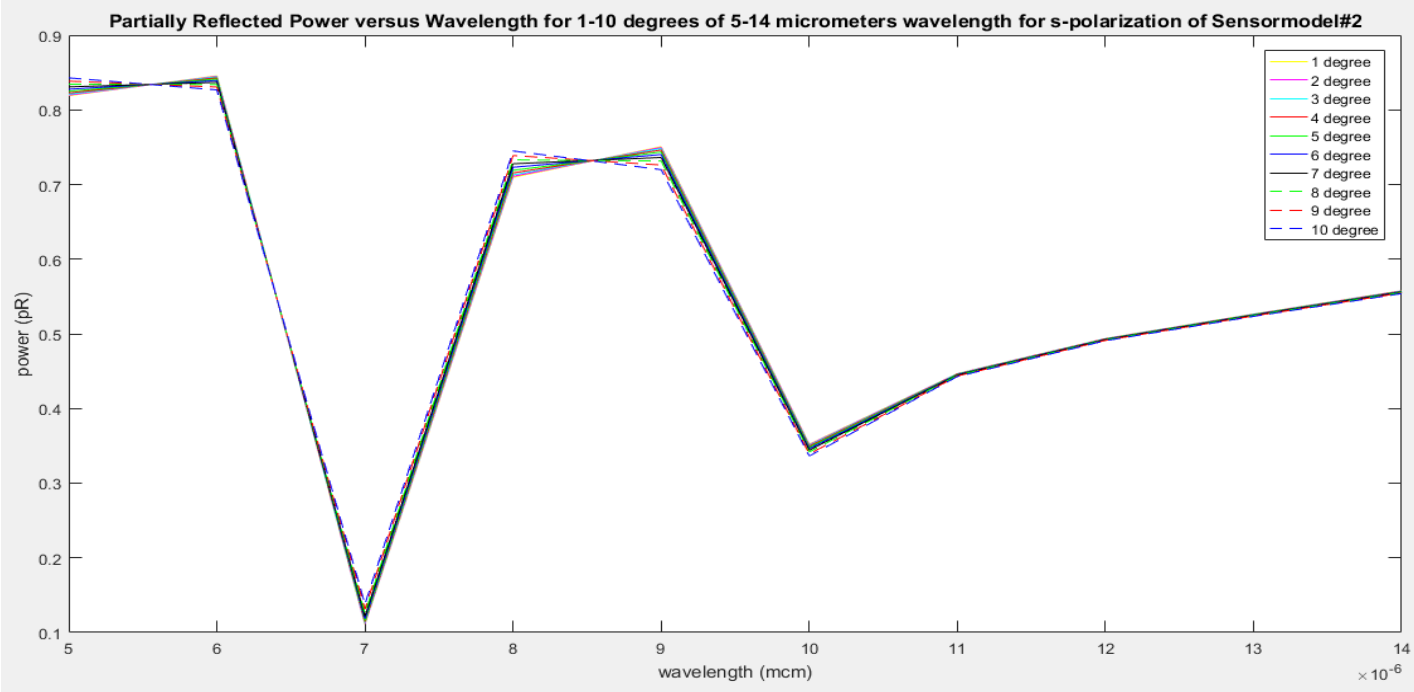


Figure 4-3-1 Partial Reflected Power versus 5-14 µm wavelength for 1-10 degrees of s-polarization

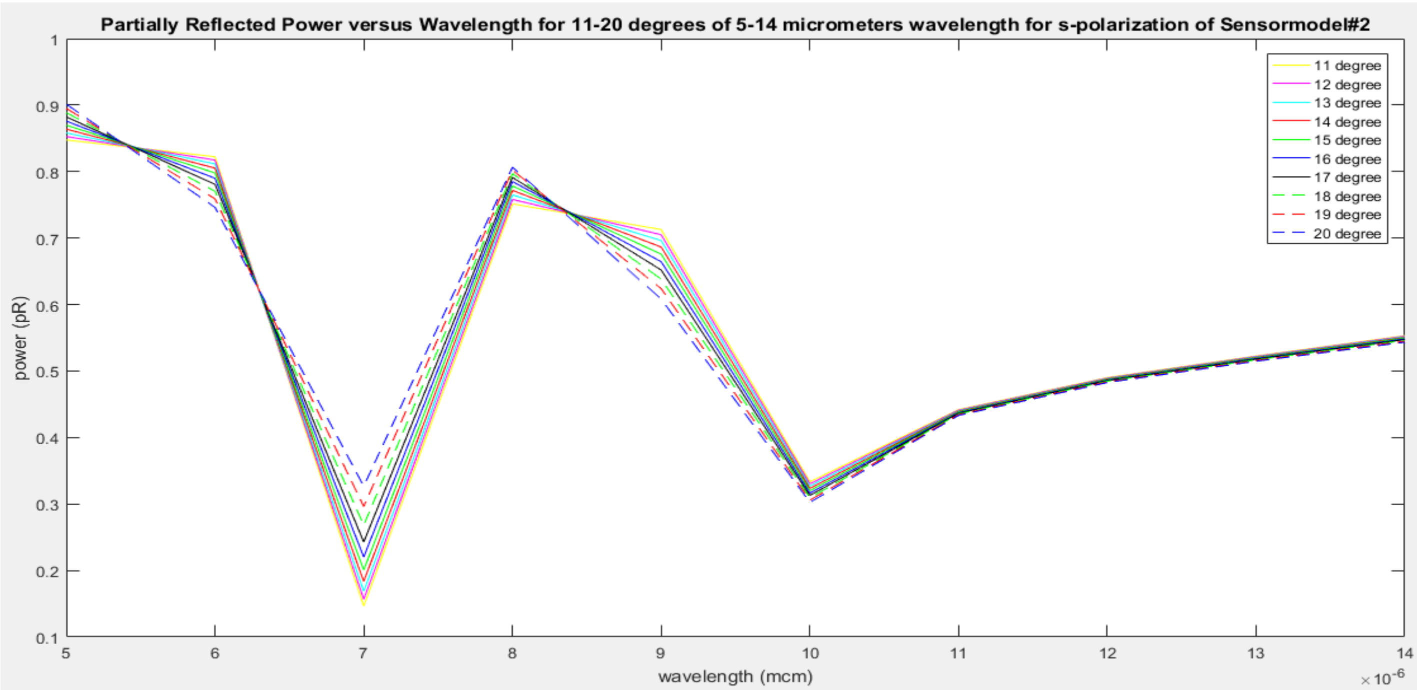


Figure 4-3-2 Partial Reflected Power versus 5-14 µm wavelength for 11-20 degrees of s-polarization

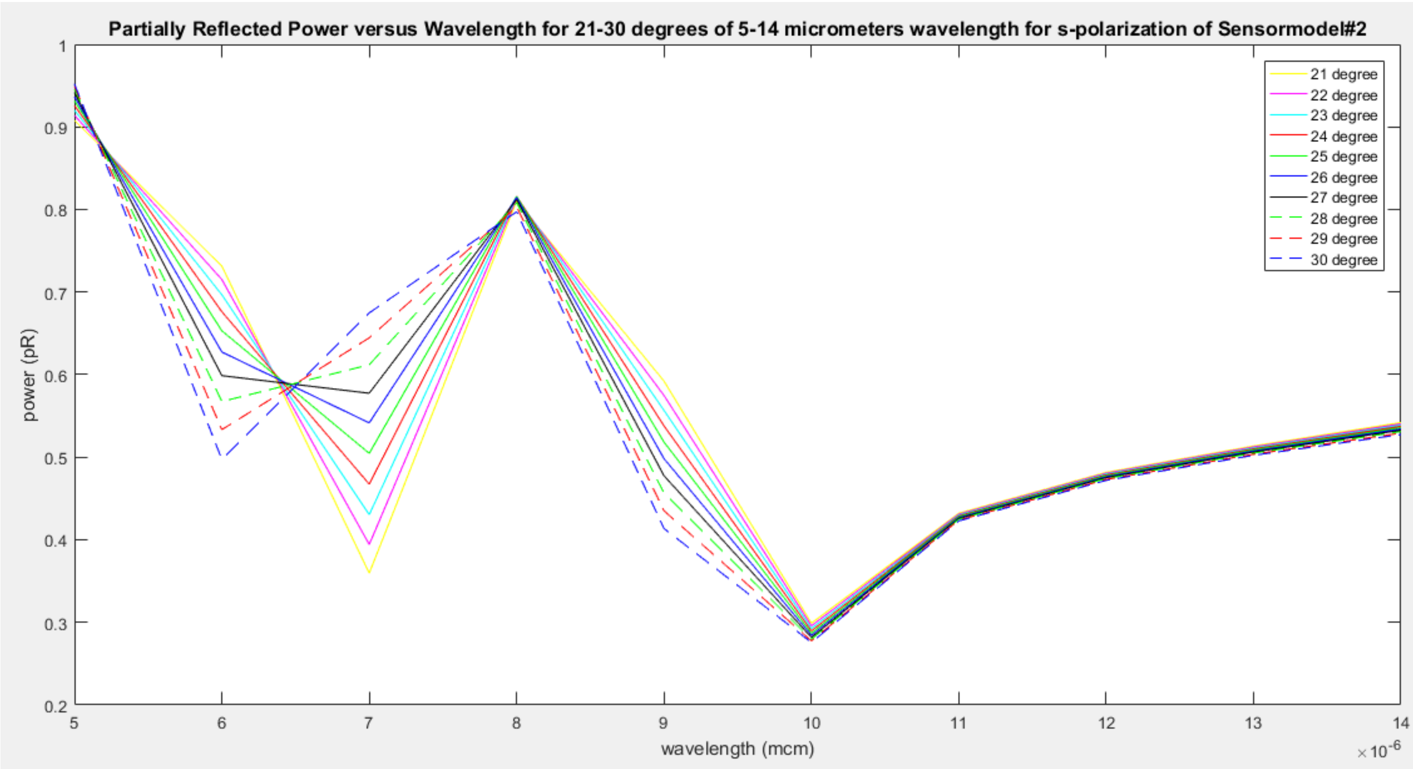


Figure 4-3-3 Partial Reflected Power versus 5-14 µm wavelength for 21-30 degrees of s-polarization

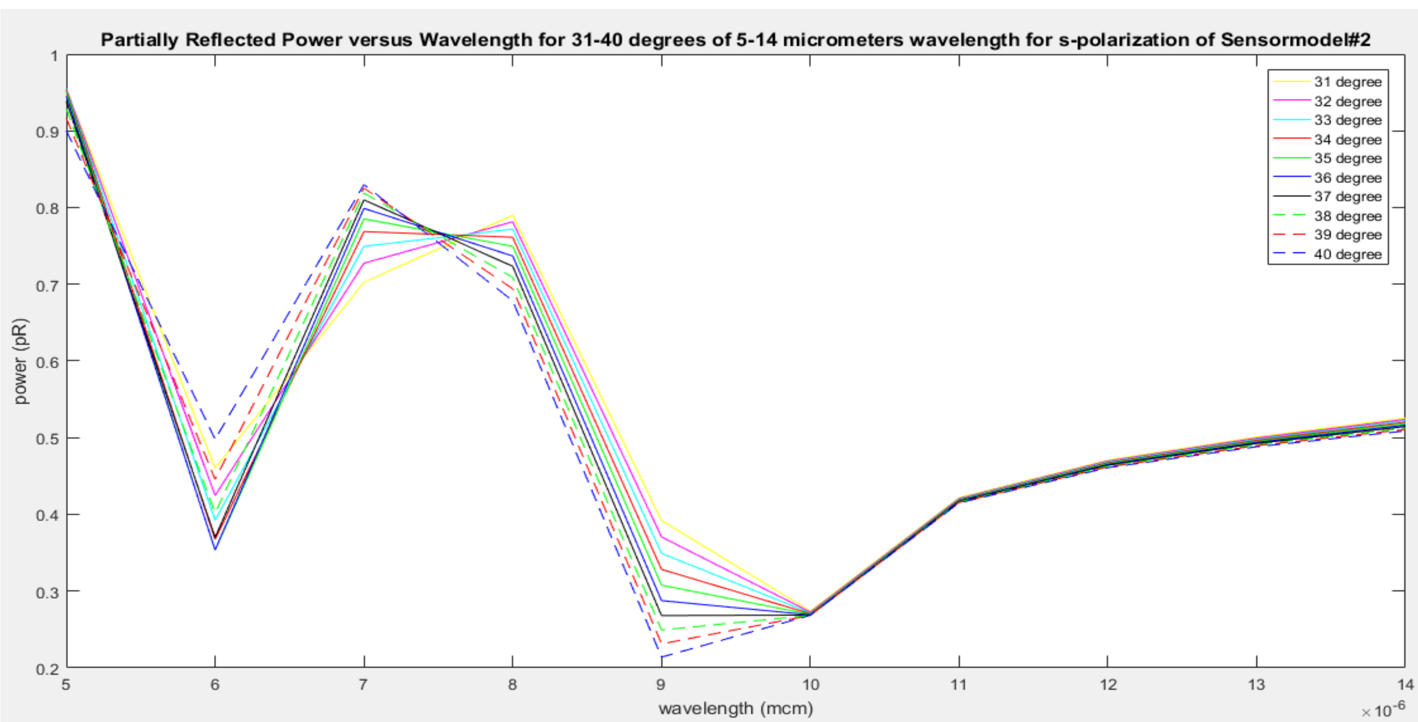


Figure 4-3-4 Partial Reflected Power versus 5-14 µm wavelength for 31-40 degrees of s-polarization

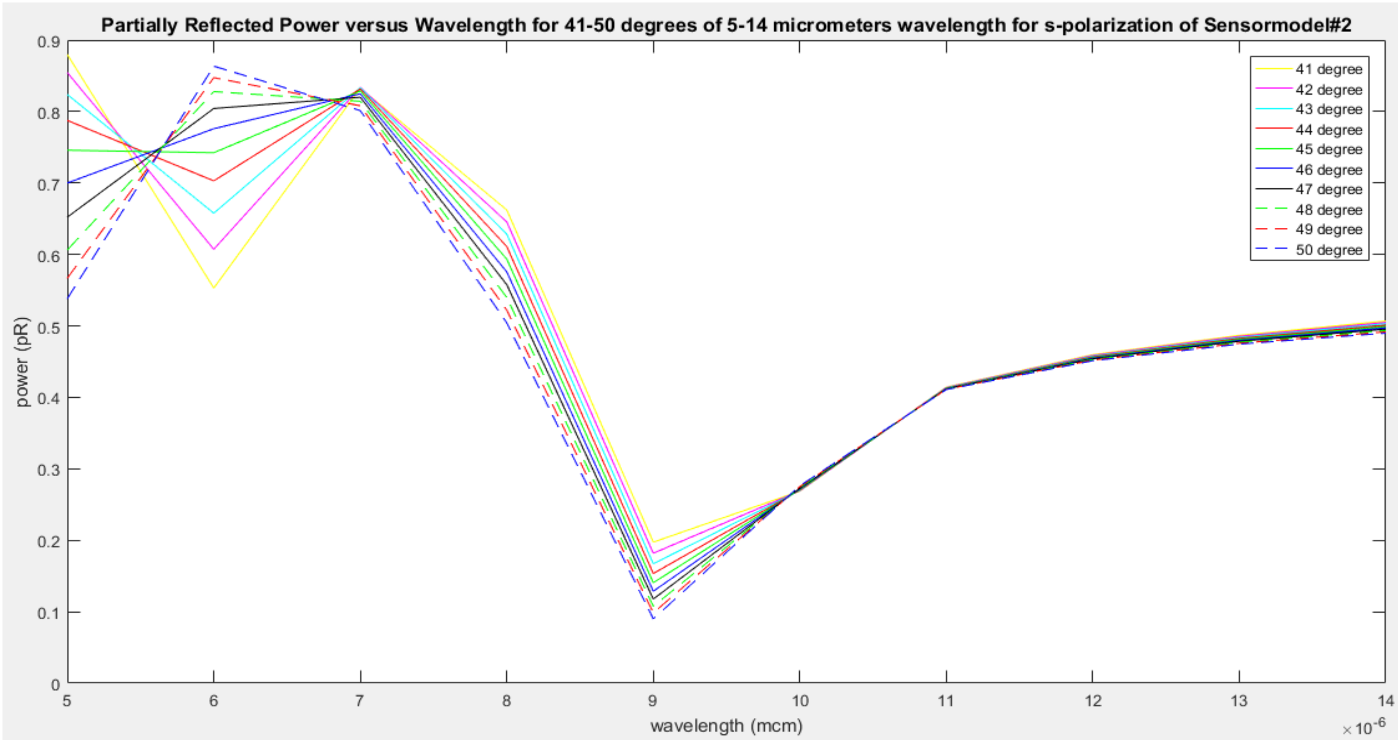


Figure 4-3-5 Partial Reflected Power versus 5-14 μm wavelength for 41-50 degrees of s-polarization

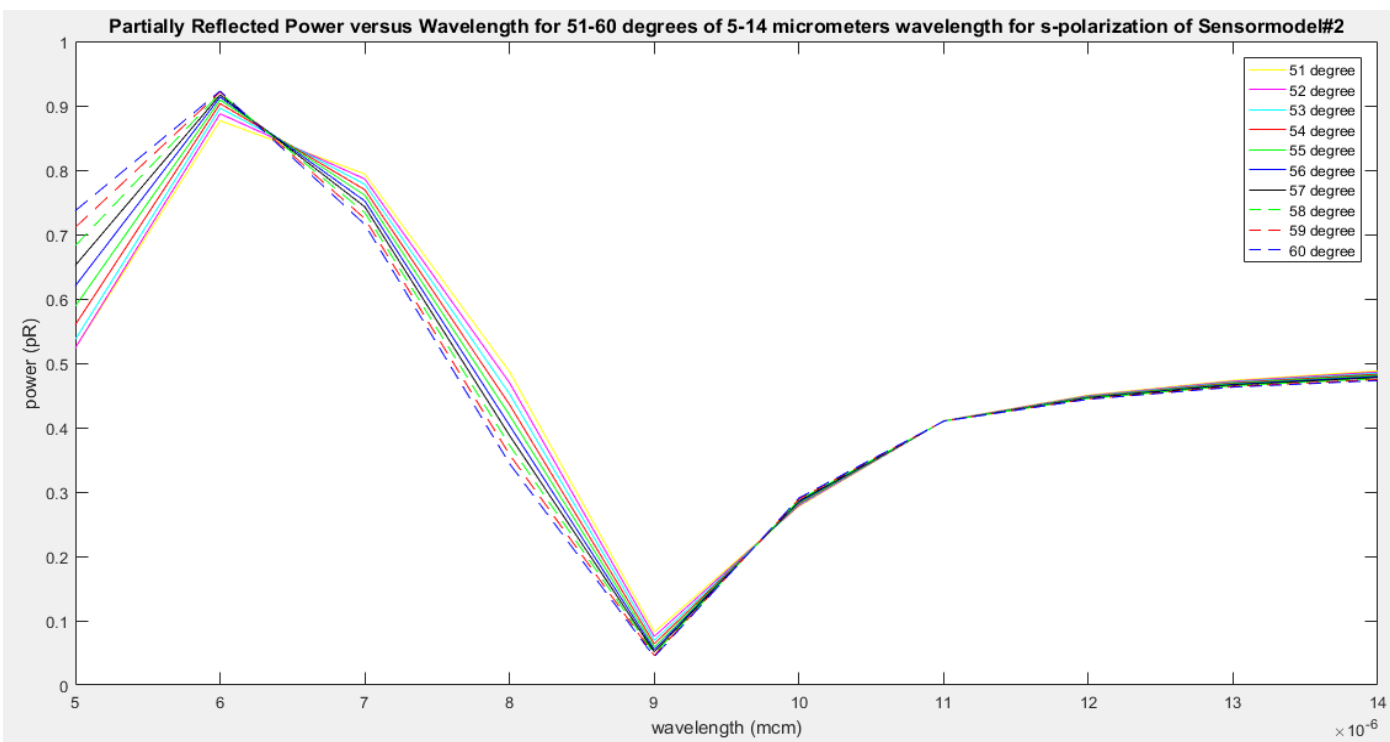


Figure 4-3-6 Partial Reflected Power versus 5-14 μm wavelength for 51-60 degrees of s-polarization

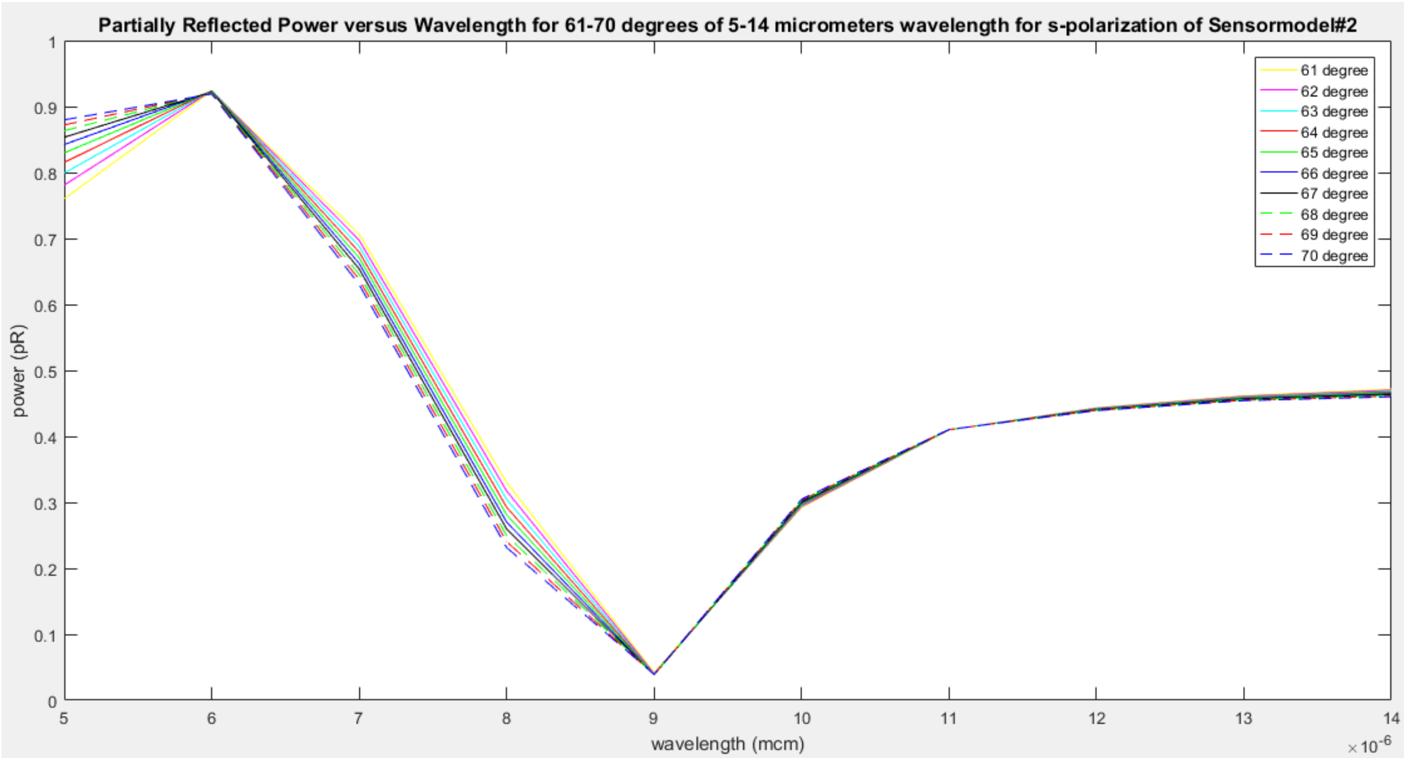


Figure 4-3-7 Partial Reflected Power versus 5-14 µm wavelength for 61-70 degrees of s-polarization

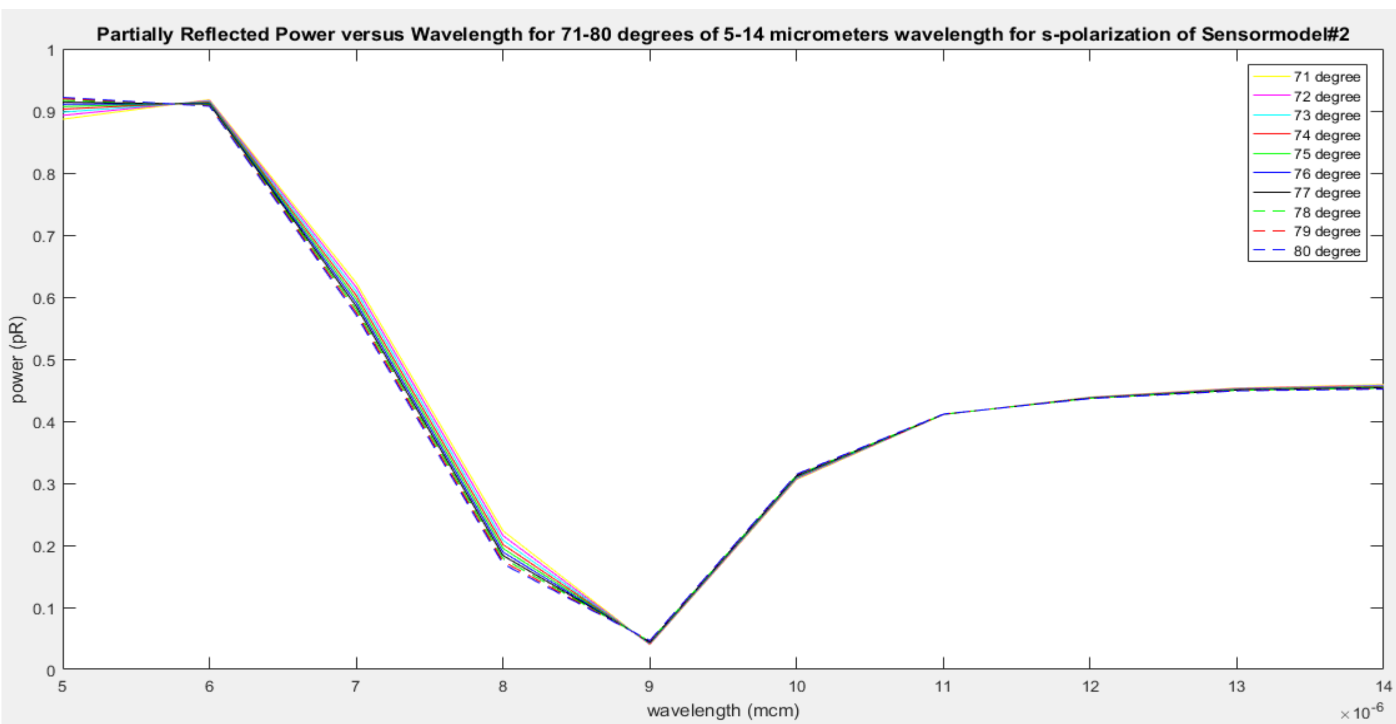


Figure 4-3-8 Partial Reflected Power versus 5-14 µm wavelength for 71-80 degrees of s-polarization

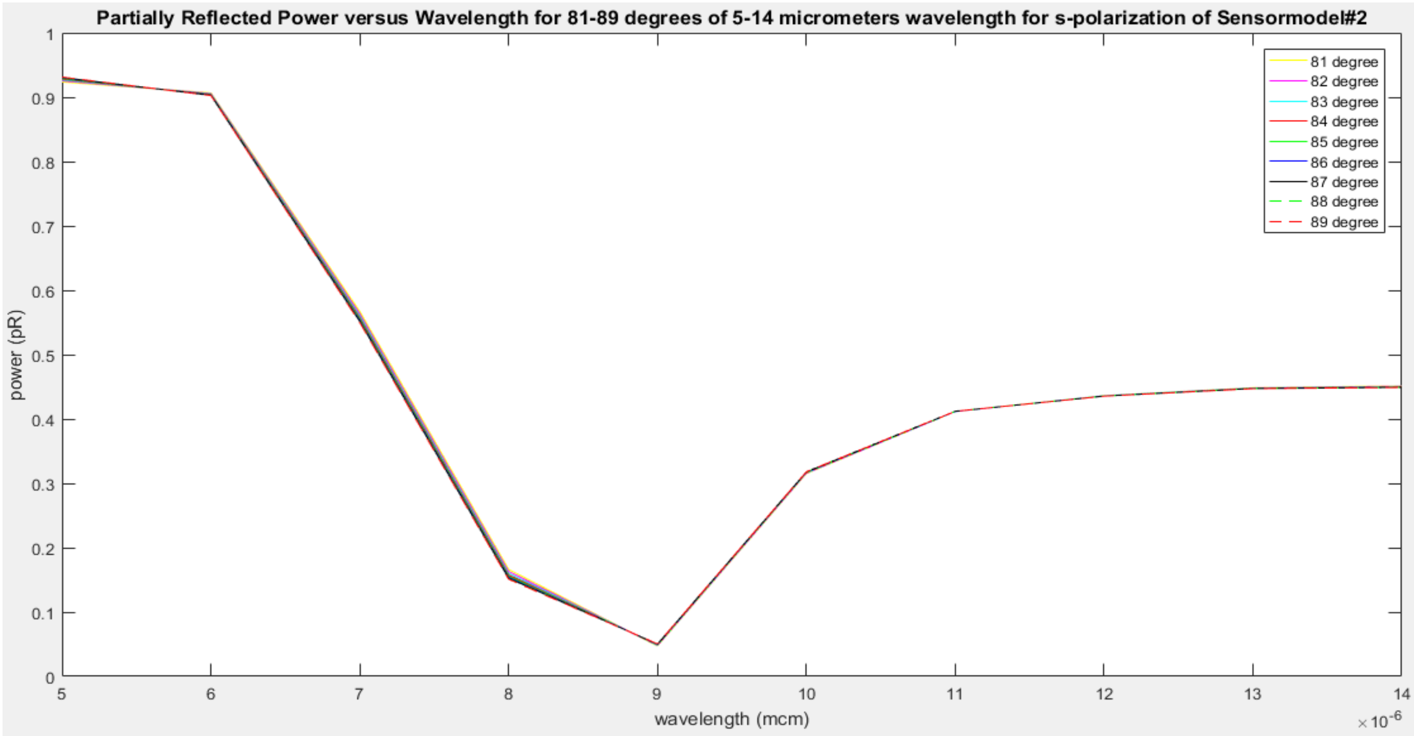


Figure 4-3-9 Partial Reflected Power versus 5-14 µm wavelength for 81-89 degrees of s-polarization

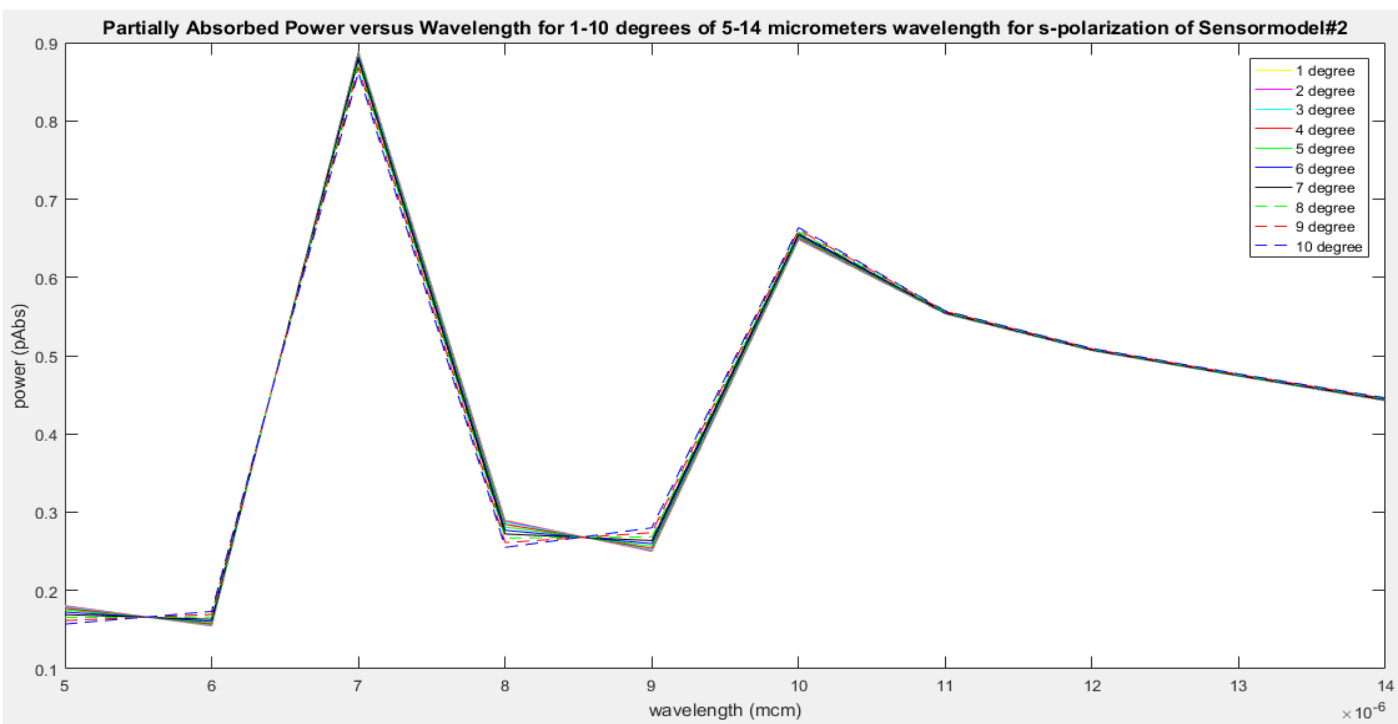


Figure 4-3-10 Partial Absorbed Power versus 5-14 µm wavelength for 1-10 degrees of s-polarization

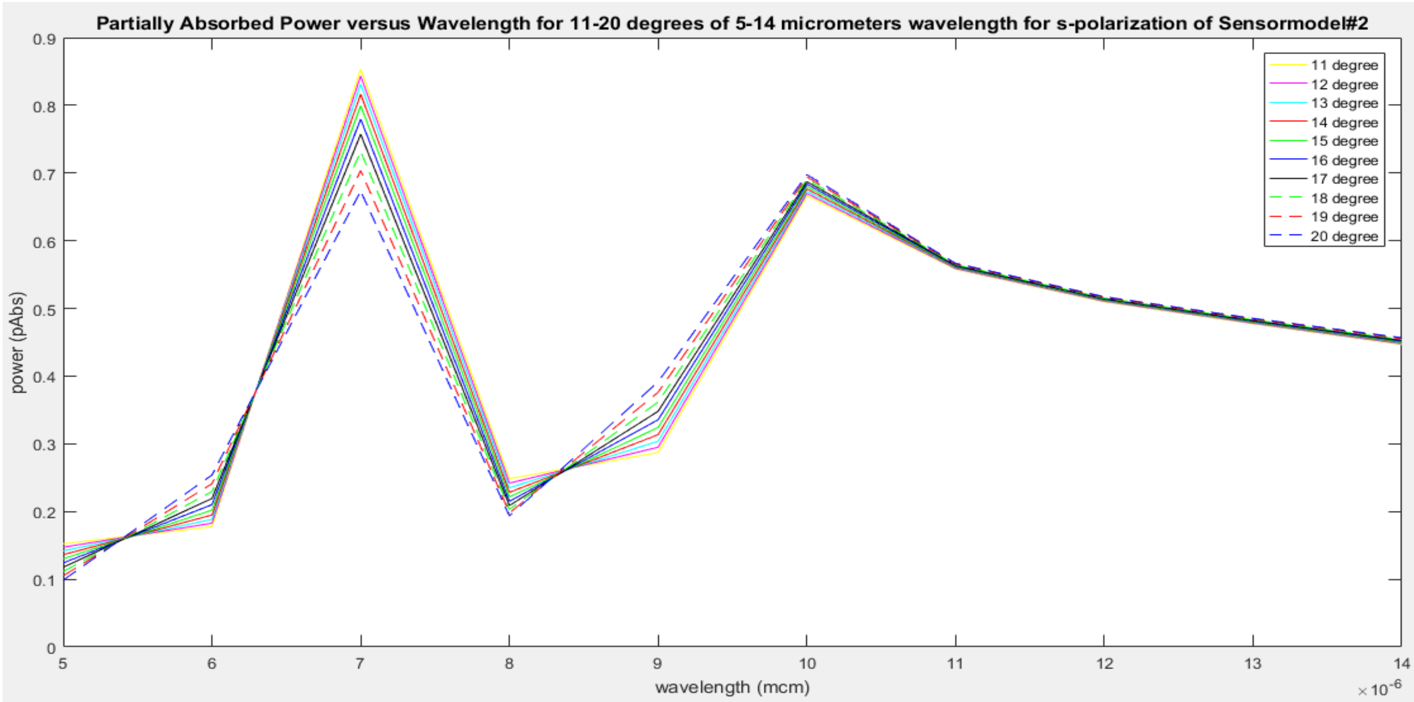


Figure 4-3-11 Partial Absorbed Power versus 5-14 µm wavelength for 11-20 degrees of s-polarization

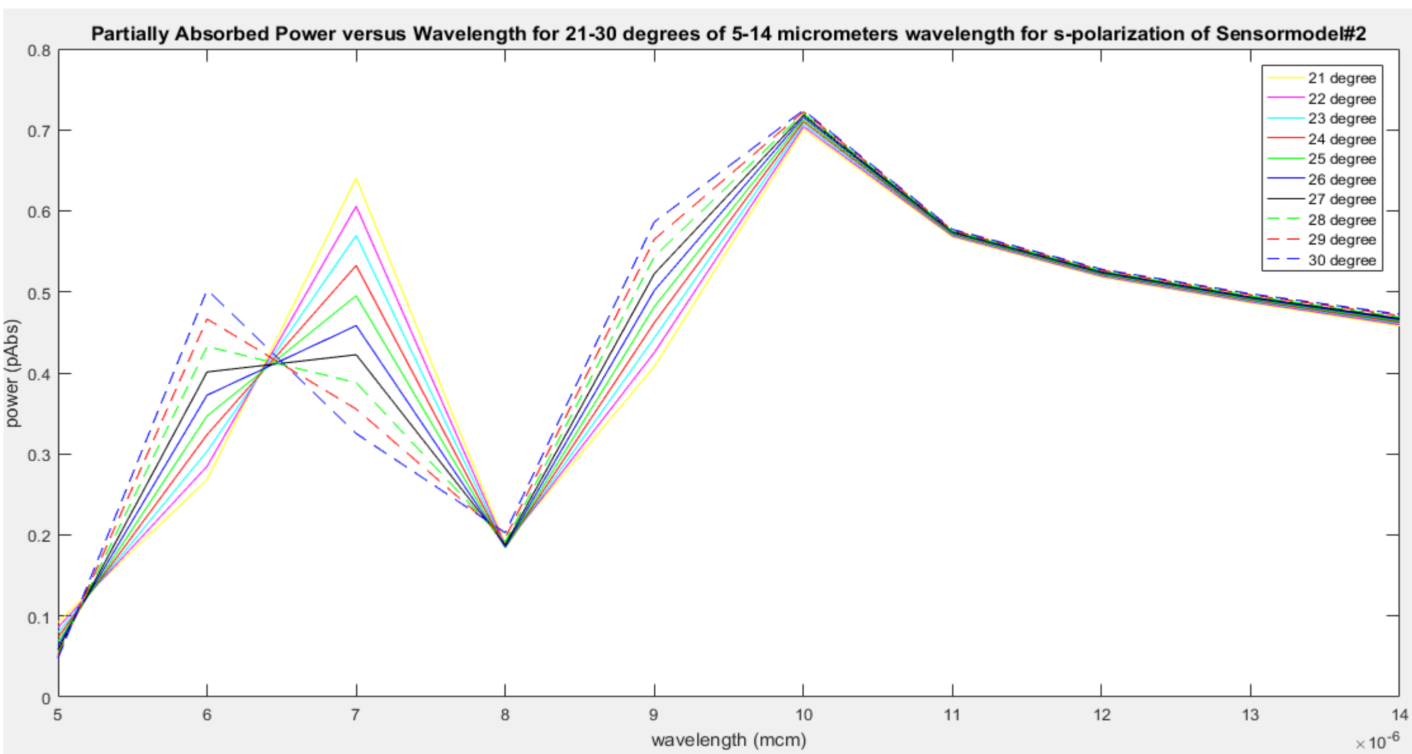


Figure 4-3-12 Partial Absorbed Power versus 5-14 µm wavelength for 21-30 degrees of s-polarization

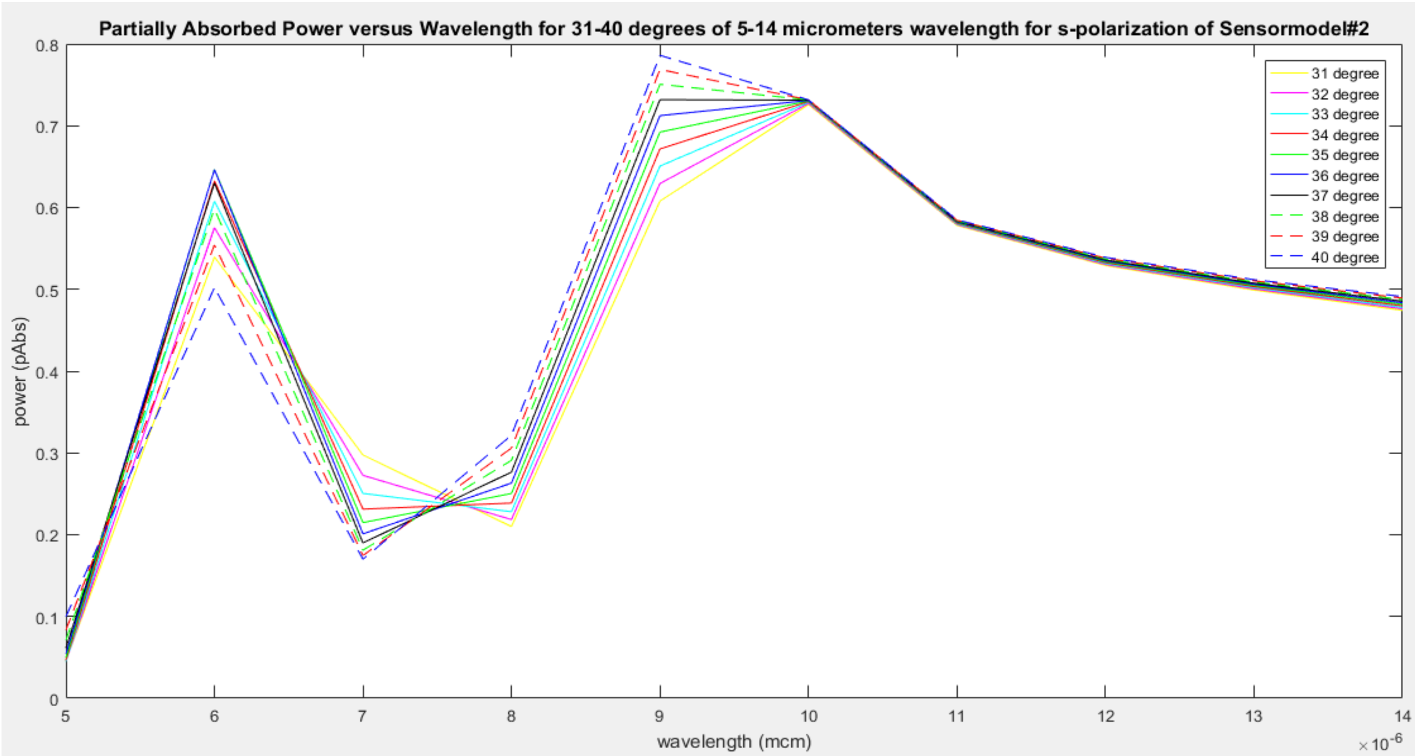


Figure 4-3-13 Partial Absorbed Power versus 5-14 µm wavelength for 31-40 degrees of s-polarization

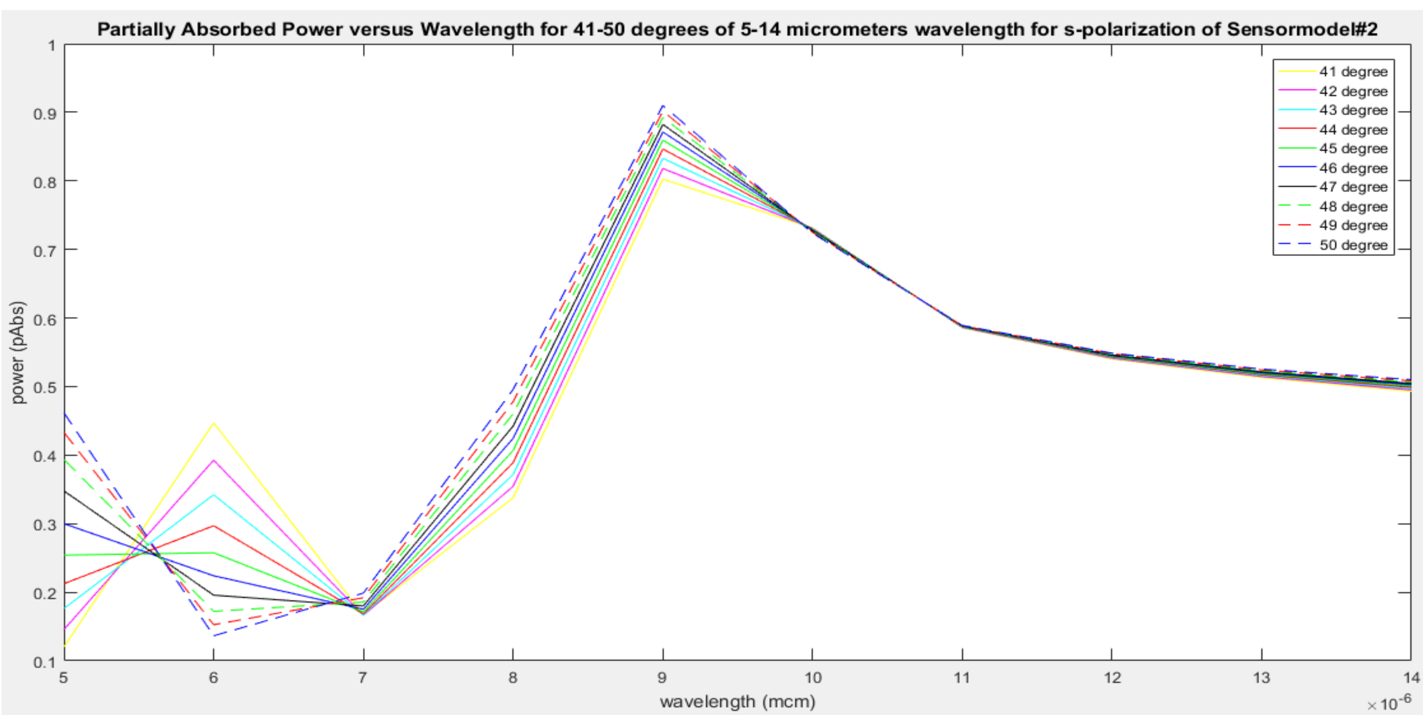


Figure 4-3-14 Partial Absorbed Power versus 5-14 µm wavelength for 41-50 degrees of s-polarization

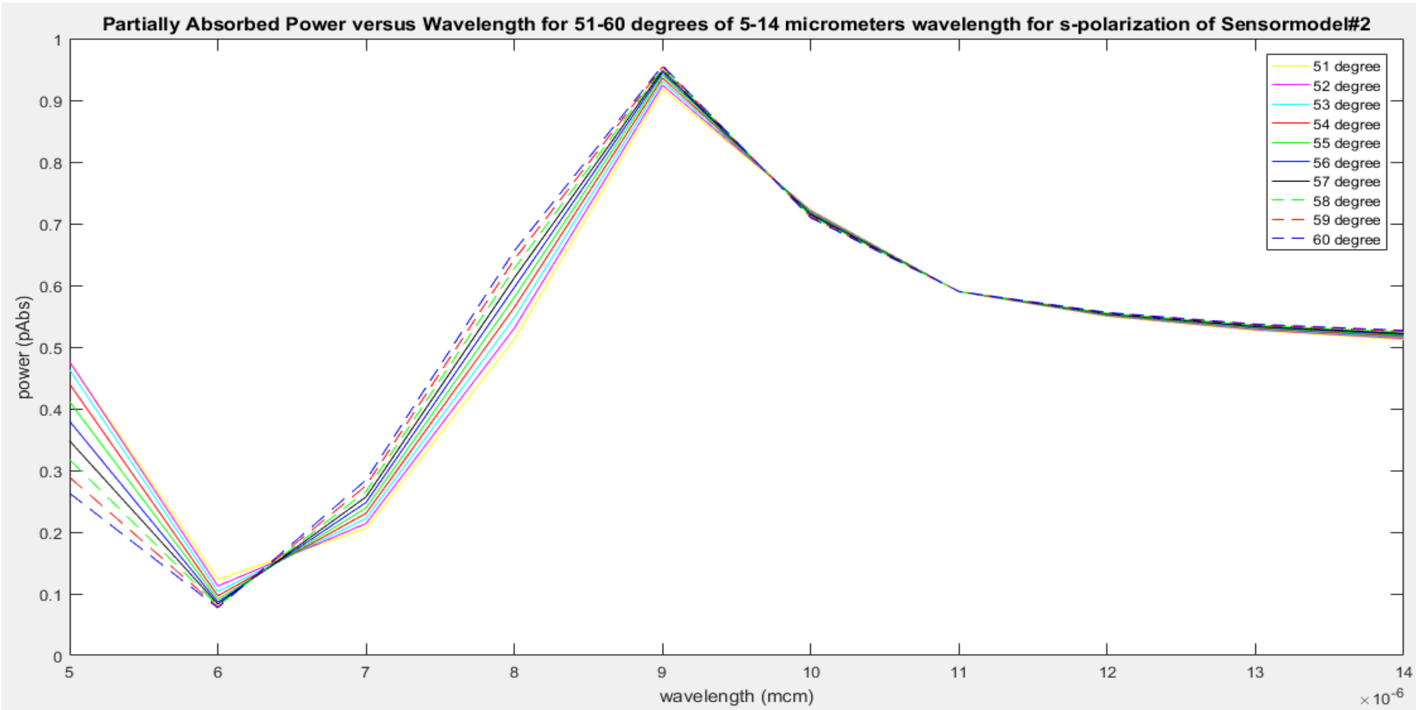


Figure 4-3-15 Partial Absorbed Power versus 5-14 μm wavelength for 51-60 degrees of s-polarization

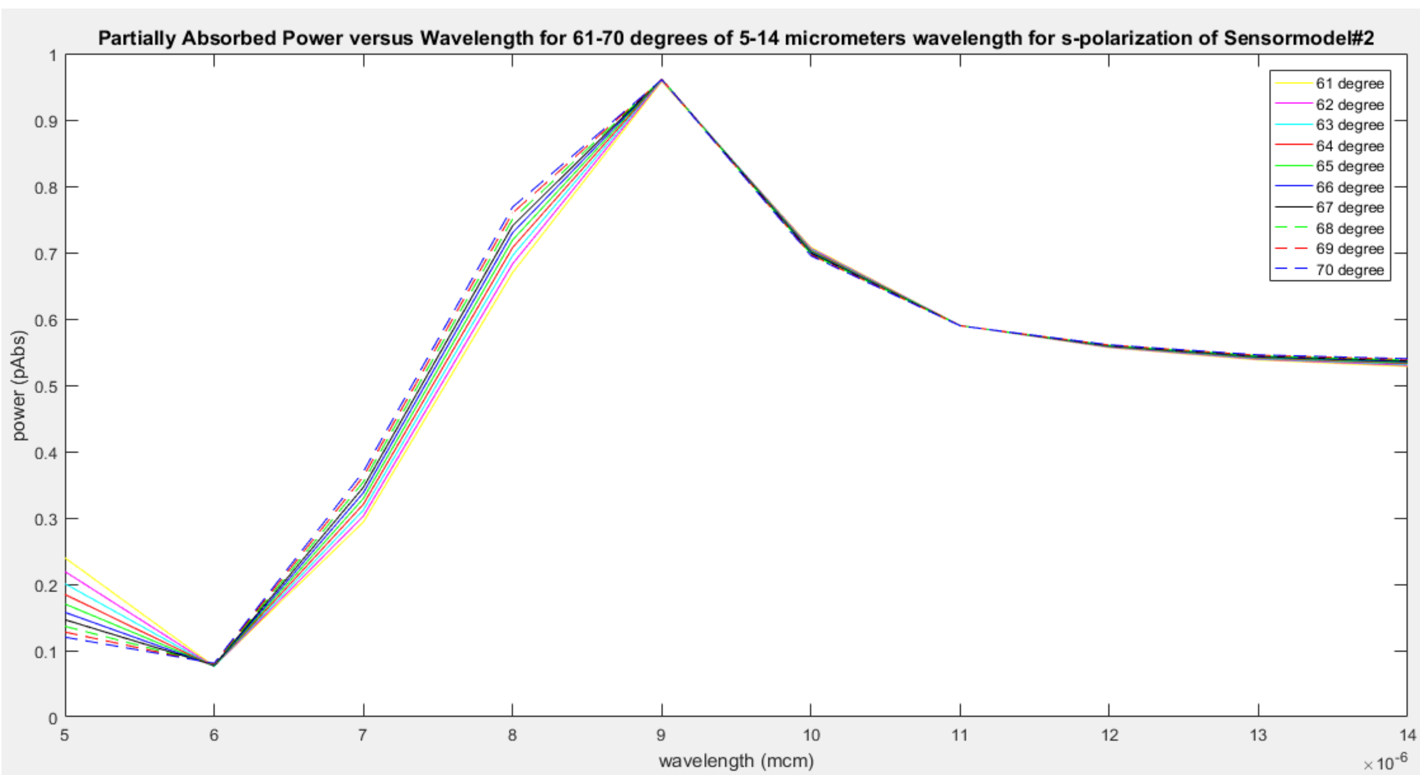


Figure 4-3-16 Partial Absorbed Power versus 5-14 μm wavelength for 61-70 degrees of s-polarization

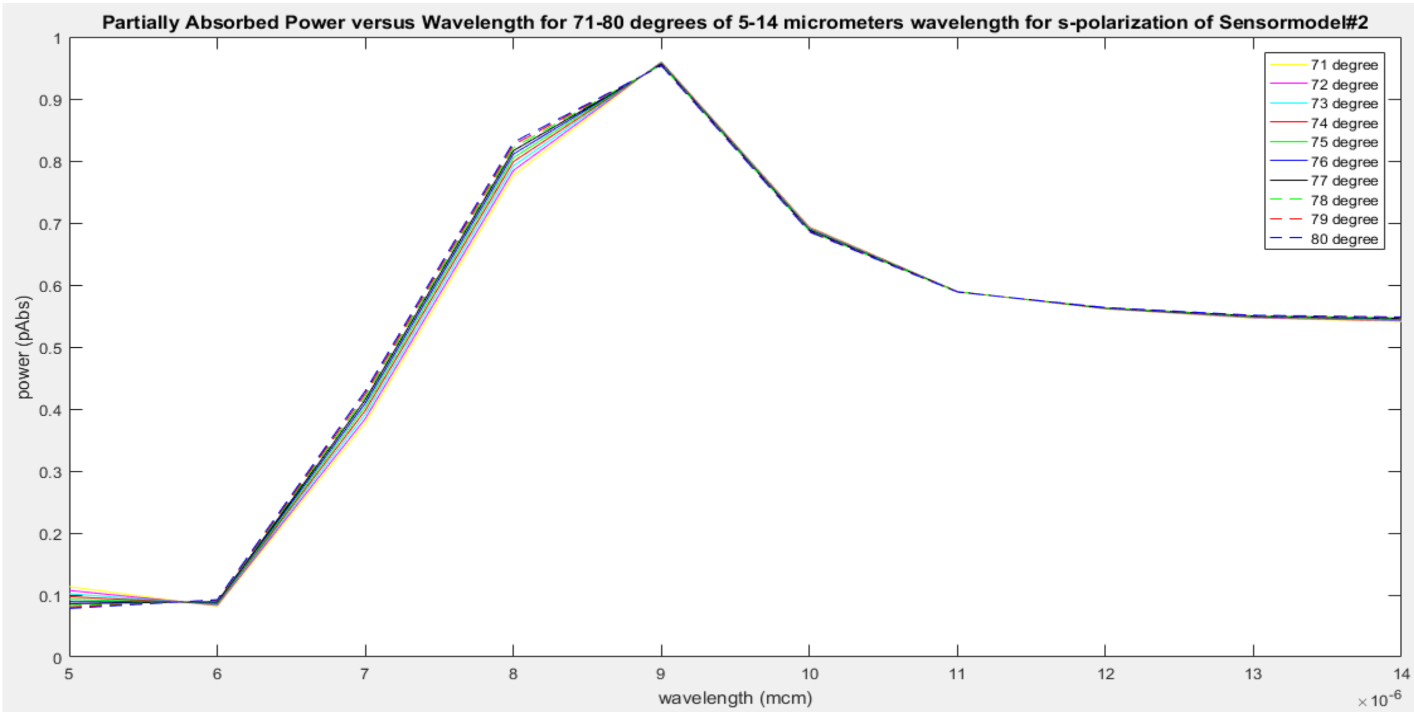


Figure 4-3-17 Partial Absorbed Power versus 5-14 μm wavelength for 71-80 degrees of s-polarization

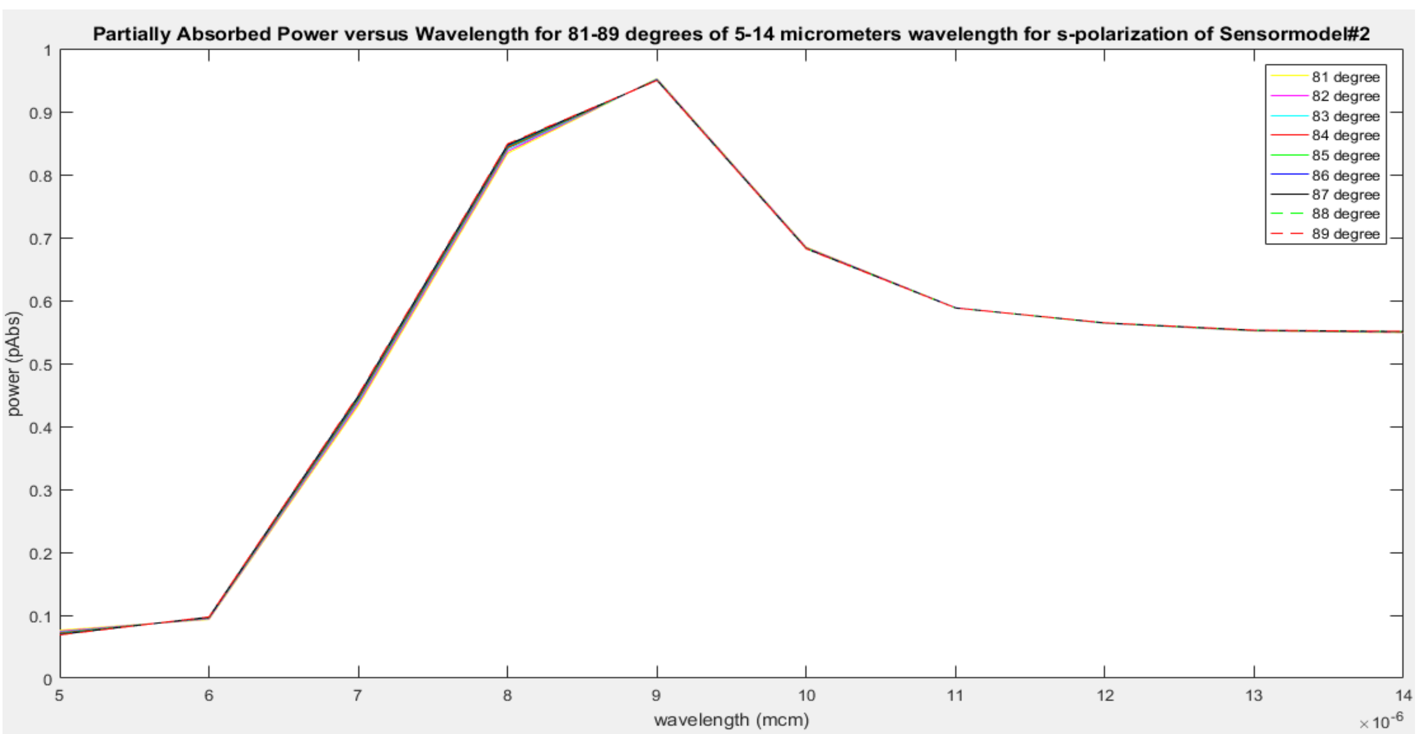


Figure 4-3-18 Partial Absorbed Power versus 5-14 μm wavelength for 81-89 degrees of s-polarization

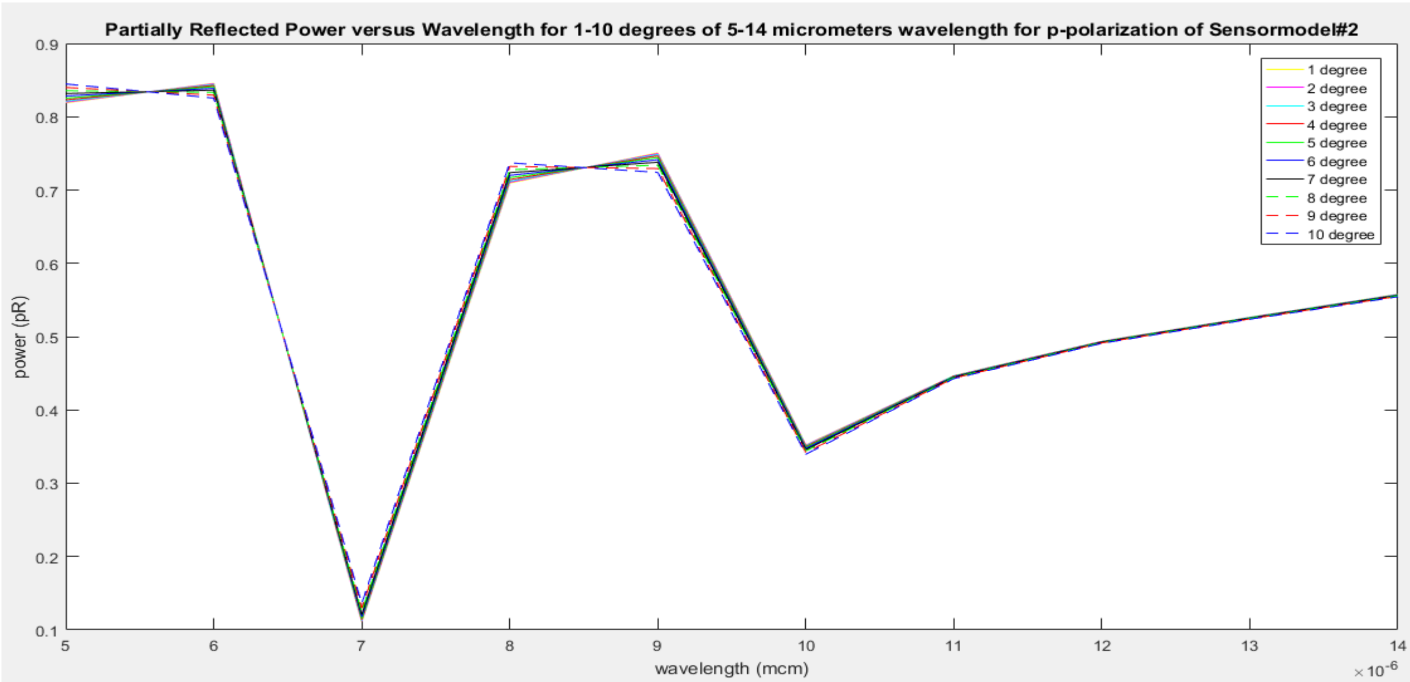


Figure 4-3-19 Partial Reflected Power versus 5-14 µm wavelength for 1-10 degrees of p-polarization

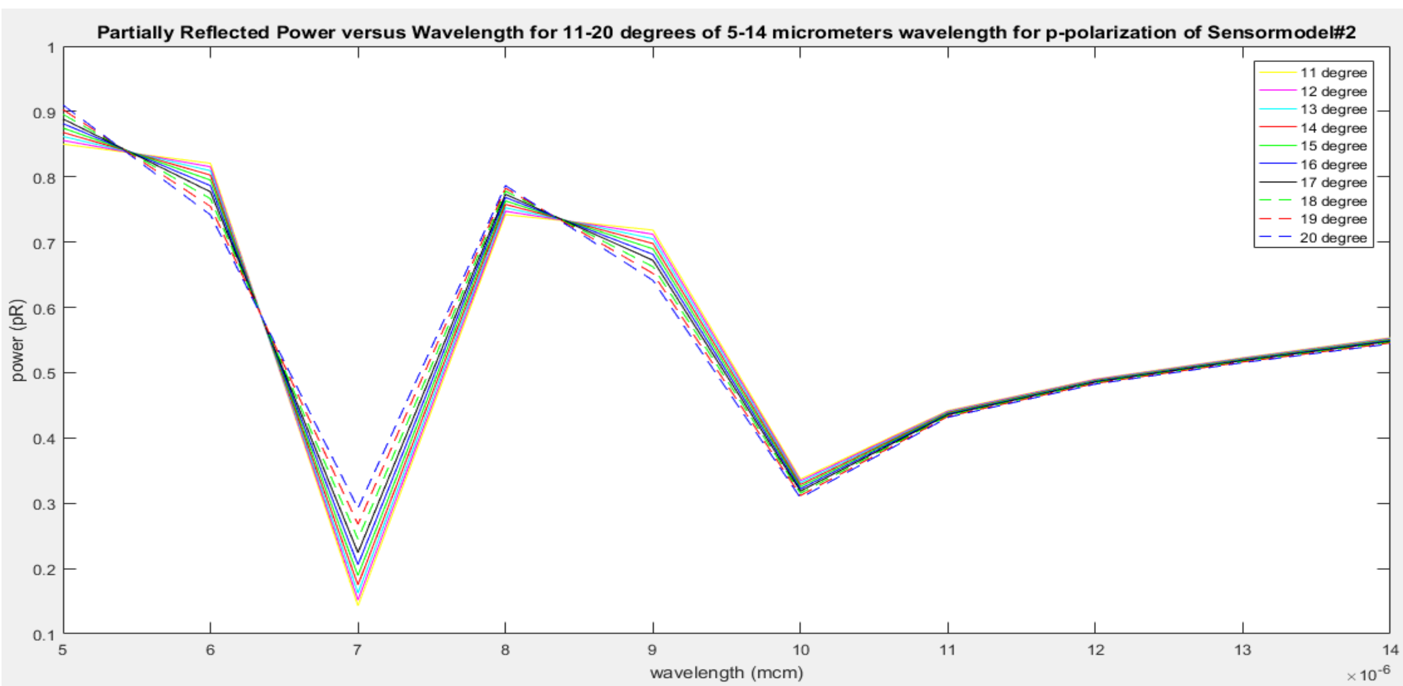


Figure 4-3-20 Partial Reflected Power versus 5-14 µm wavelength for 11-20 degrees of p-polarization

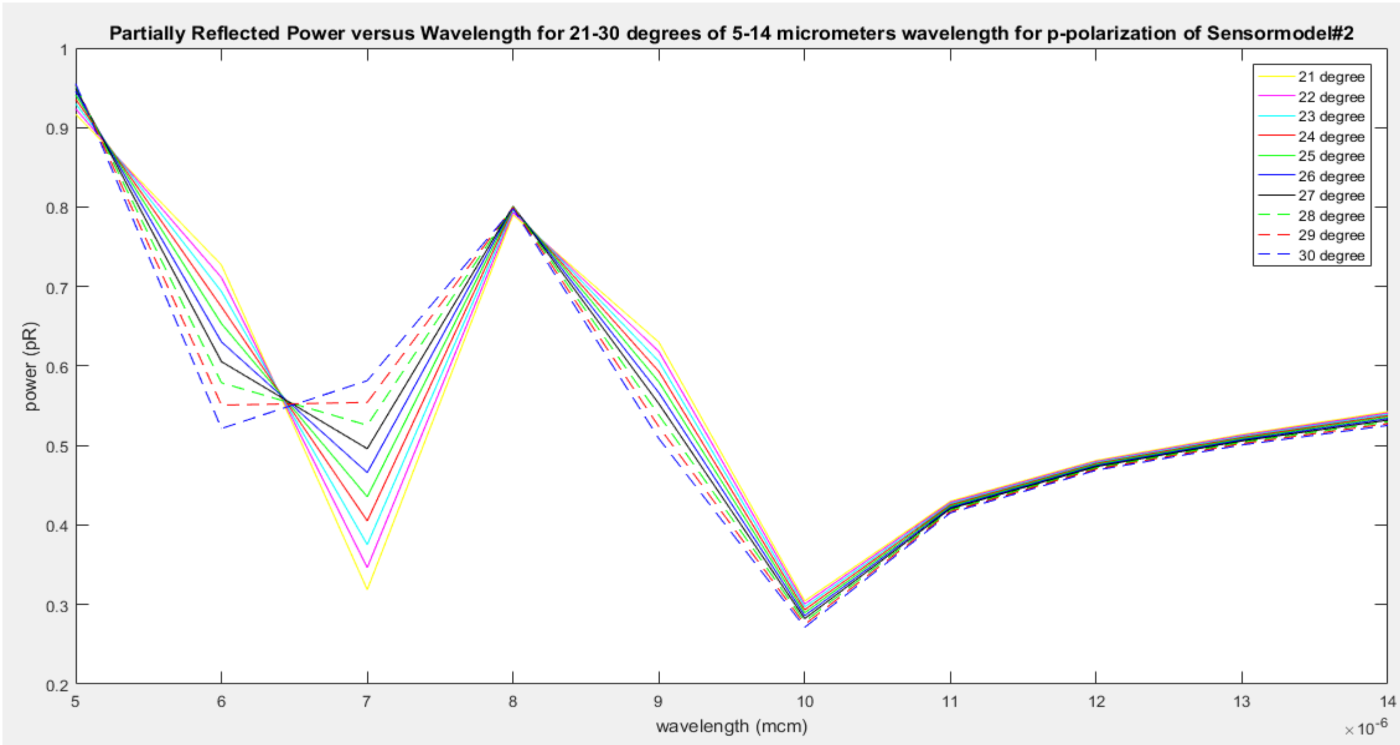


Figure 4-3-21 Partial Reflected Power versus 5-14 µm wavelength for 21-30 degrees of p-polarization

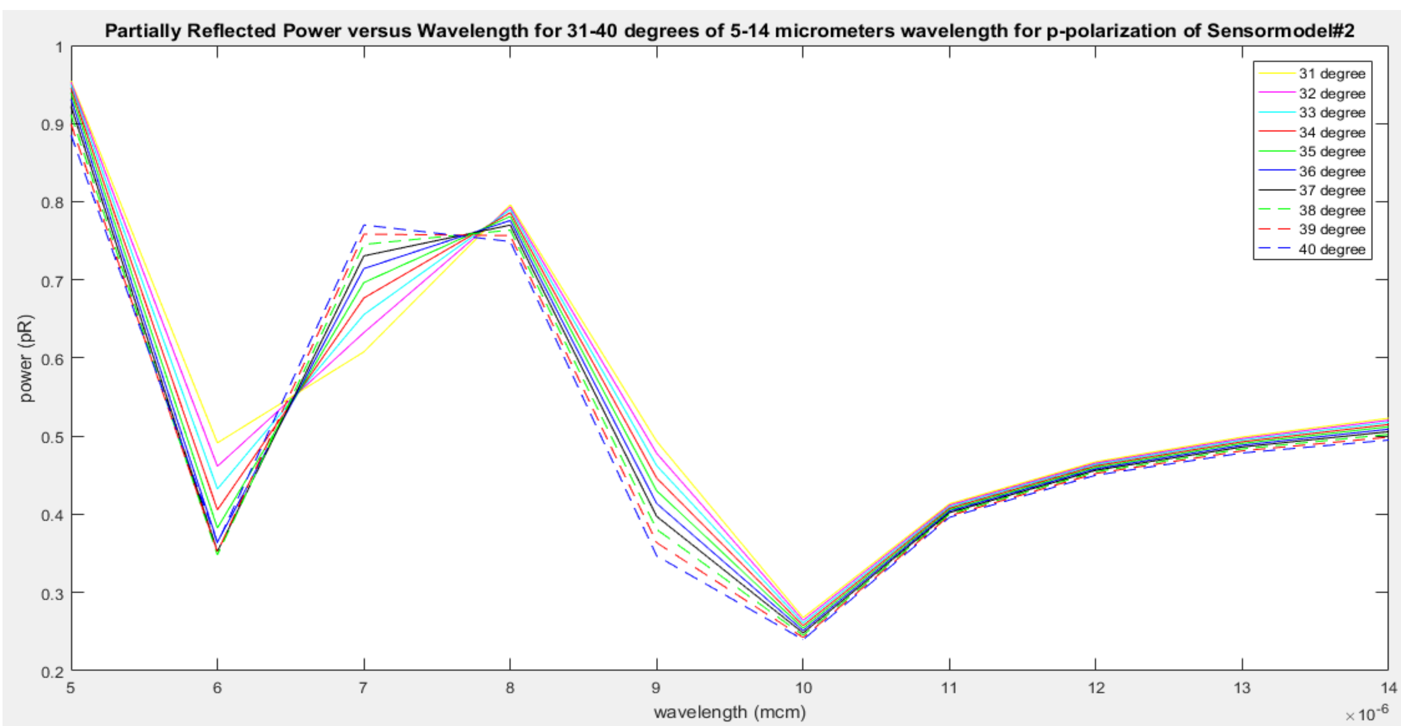


Figure 4-3-22 Partial Reflected Power versus 5-14 µm wavelength for 31-40 degrees of p-polarization

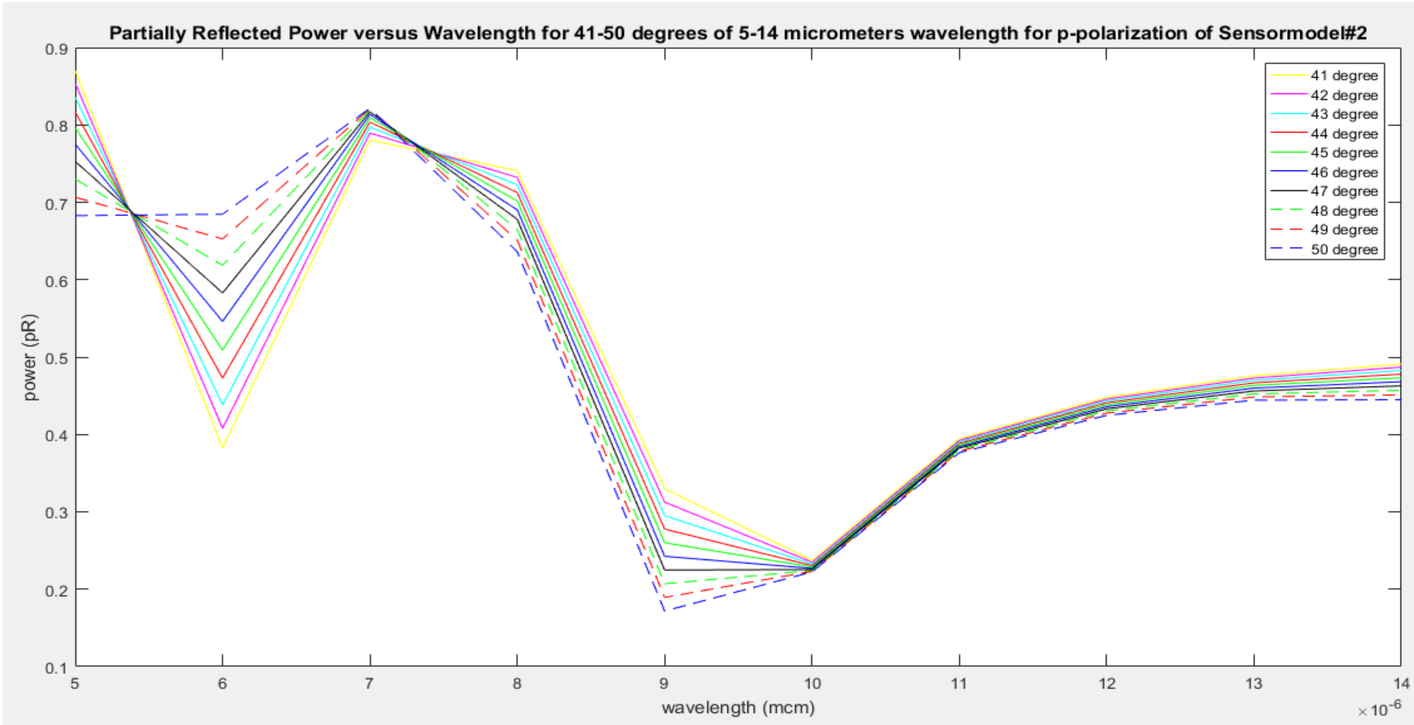


Figure 4-3-23 Partial Reflected Power versus 5-14 µm wavelength for 41-50 degrees of p-polarization

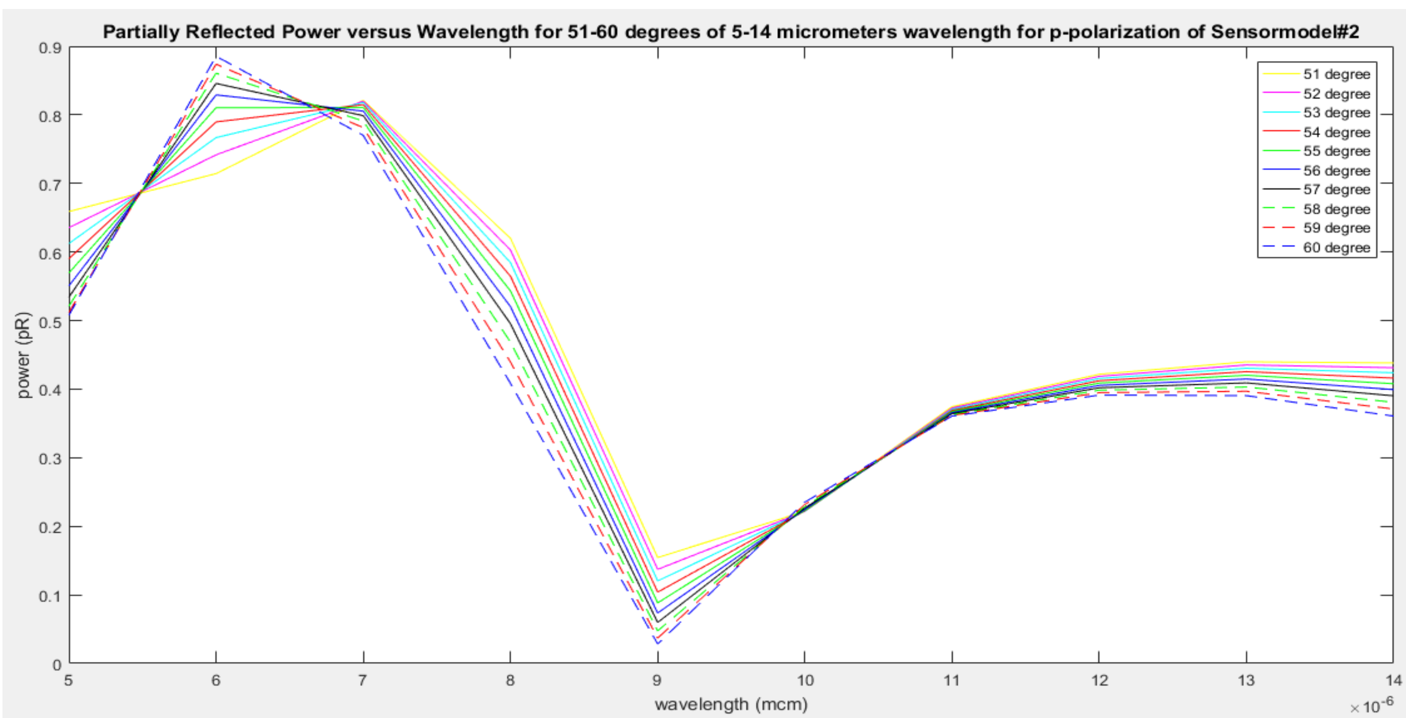


Figure 4-3-24 Partial Reflected Power versus 5-14 µm wavelength for 51-60 degrees of p-polarization

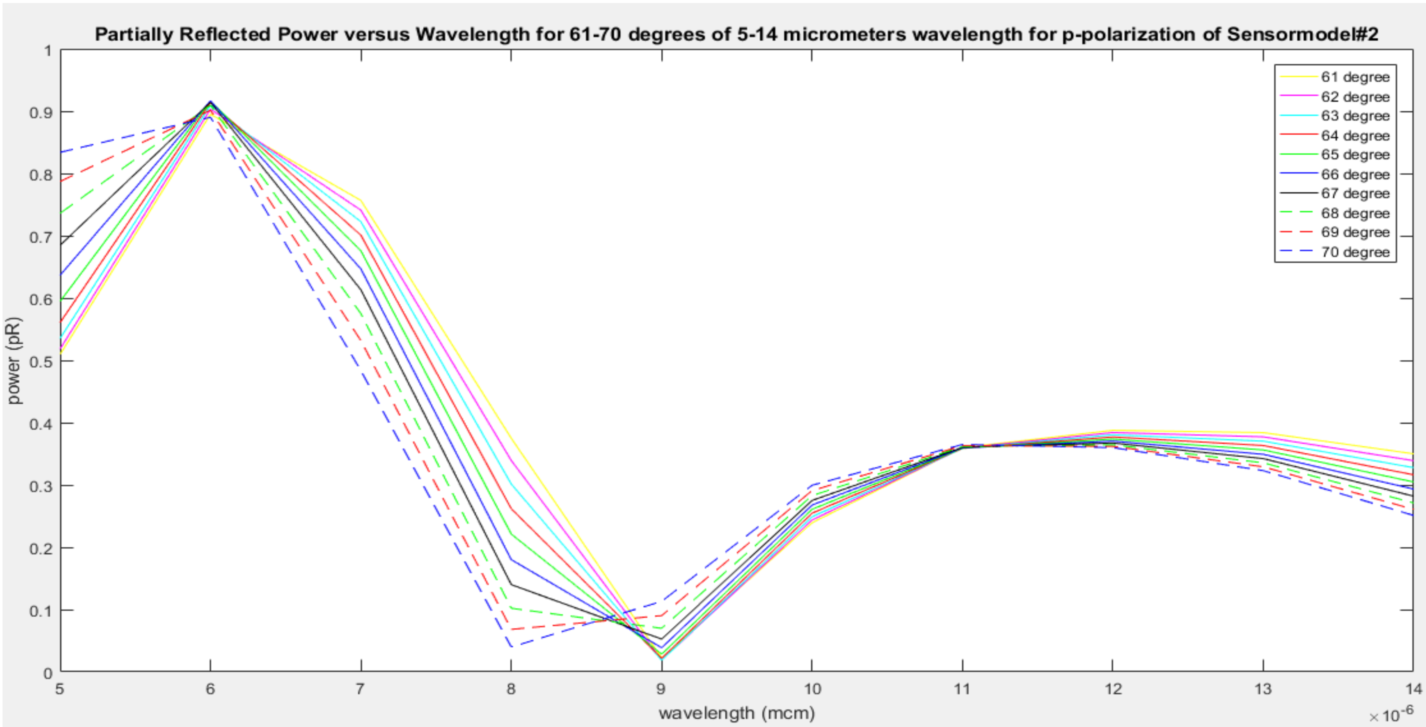


Figure 4-3-25 Partial Reflected Power versus 5-14 µm wavelength for 61-70 degrees of p-polarization

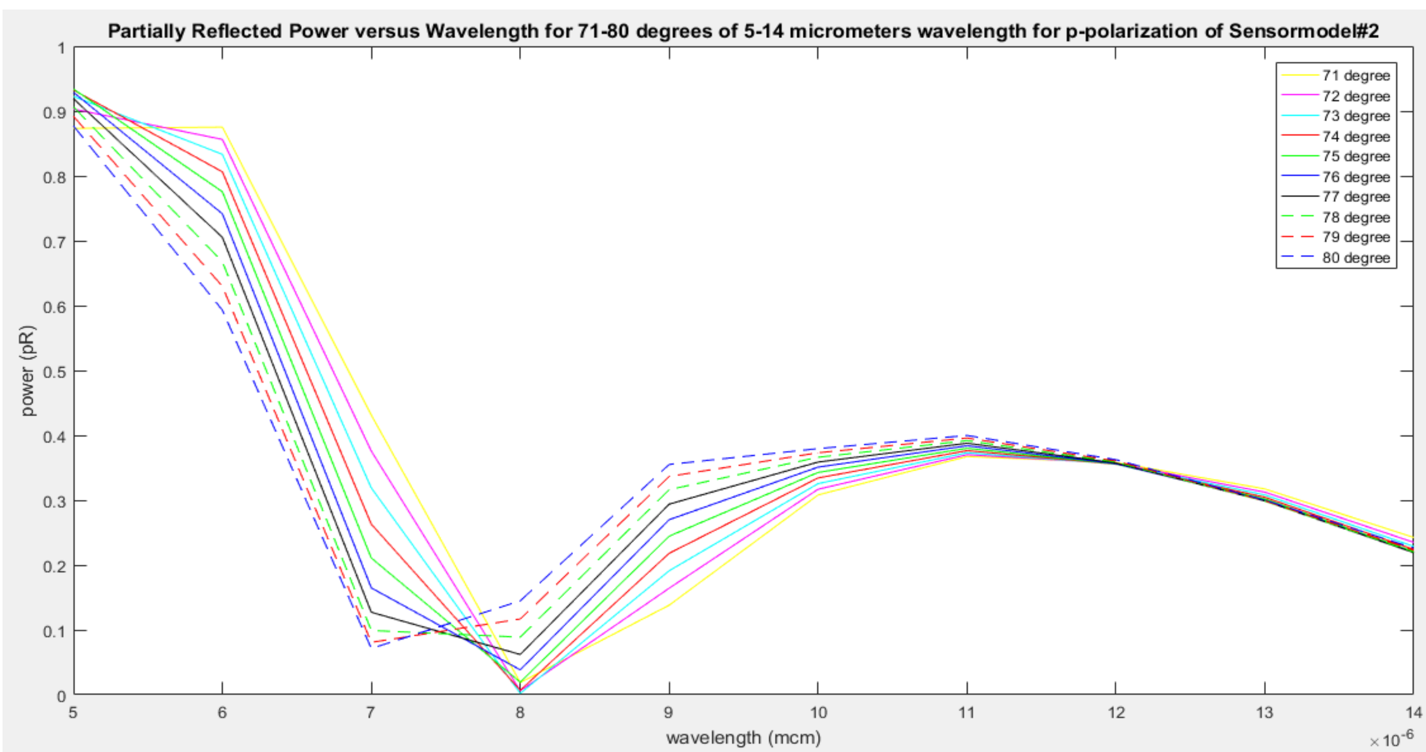


Figure 4-3-26 Partial Reflected Power versus 5-14 µm wavelength for 71-80 degrees of p-polarization

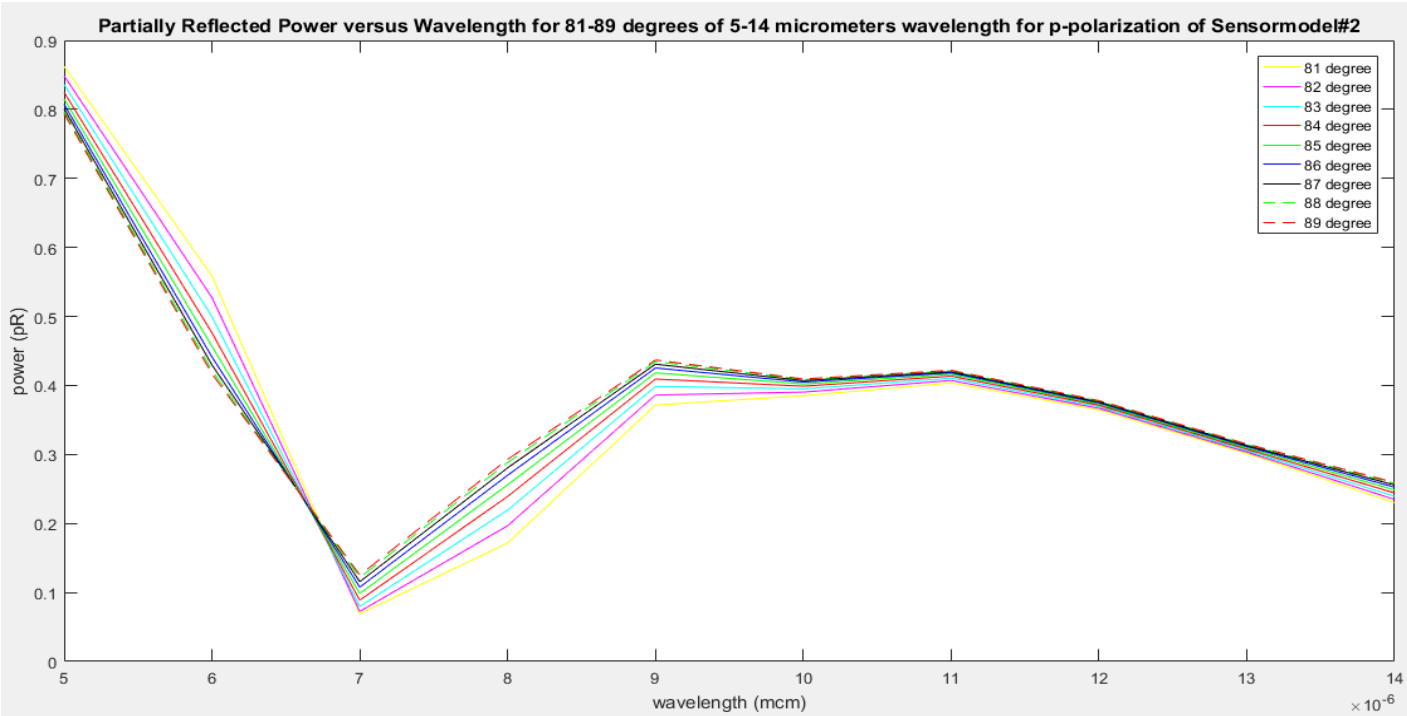


Figure 4-3-27 Partial Reflected Power versus 5-14 µm wavelength for 81-89 degrees of p-polarization

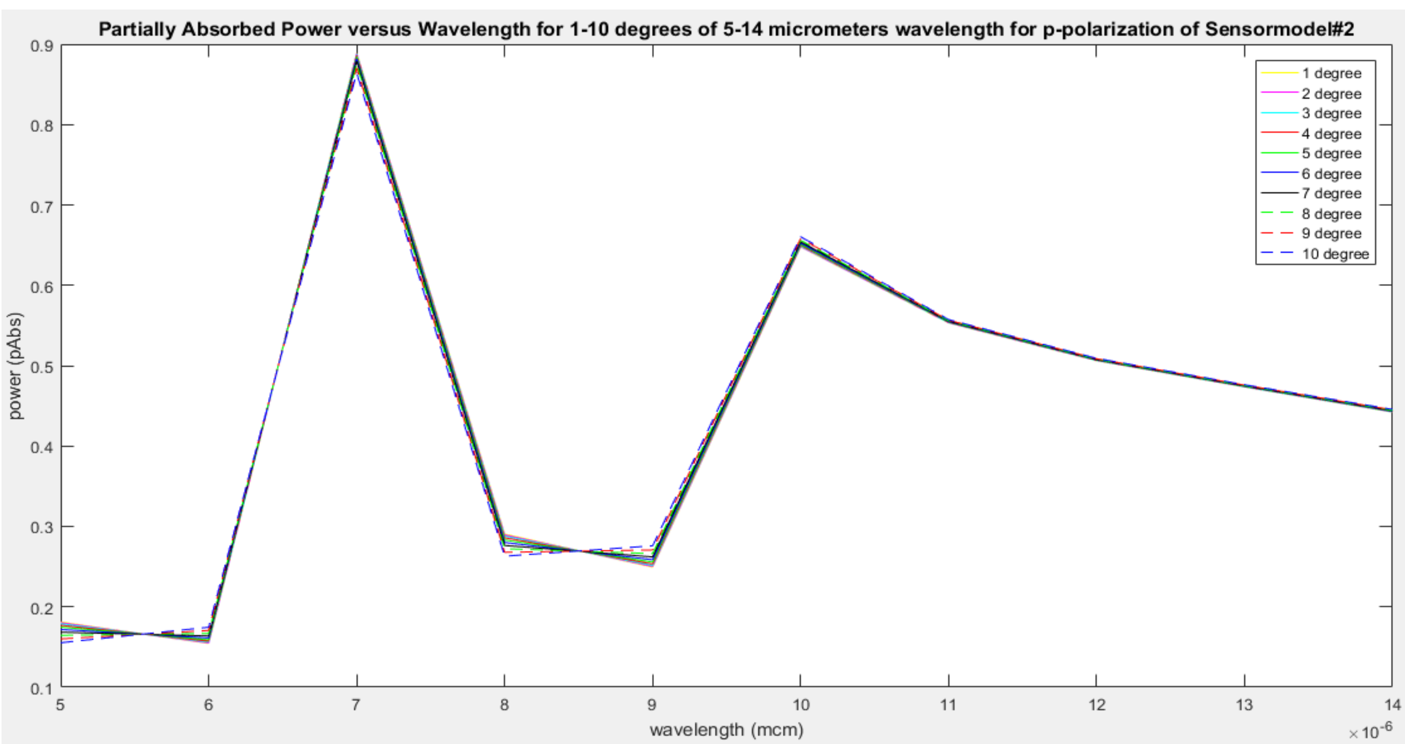


Figure 4-3-28 Partial Absorbed Power versus 5-14 µm wavelength for 1-10 degrees of p-polarization

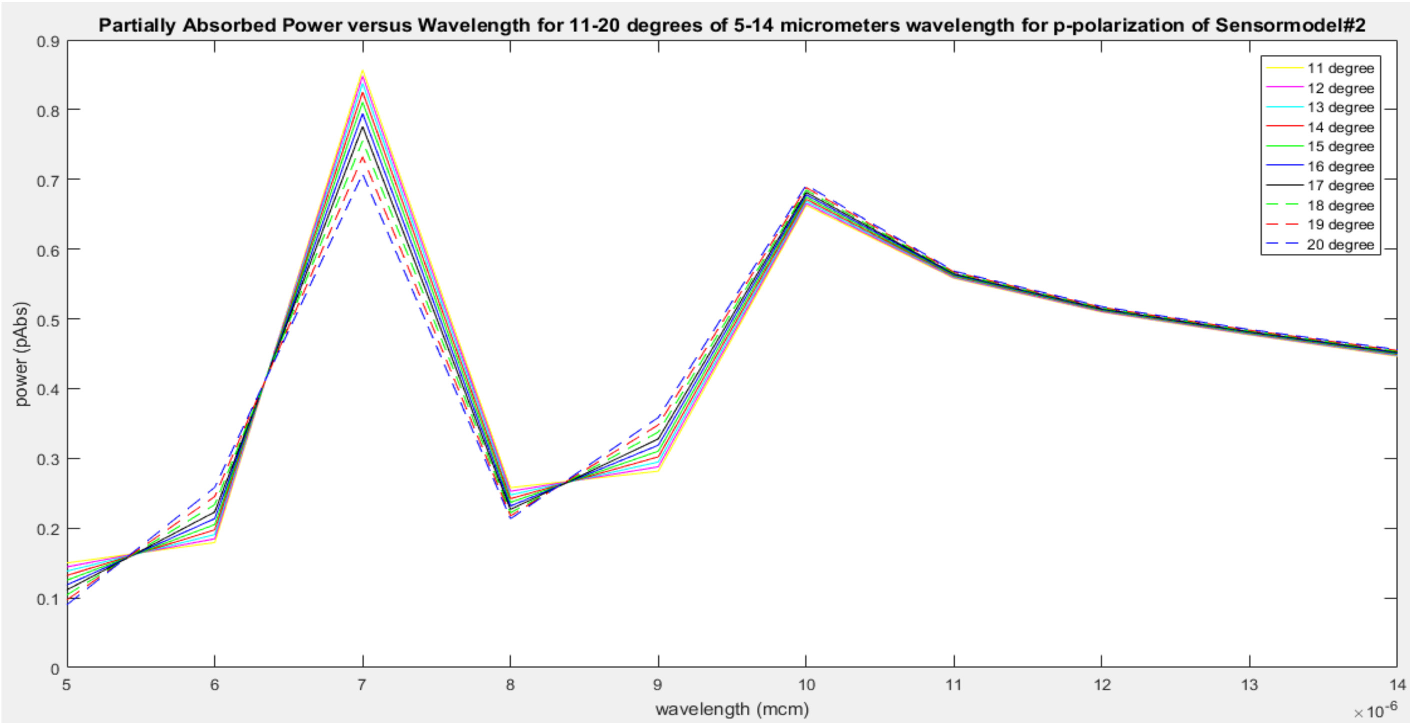


Figure 4-3-29 Partial Absorbed Power versus 5-14 μm wavelength for 11-20 degrees of p-polarization

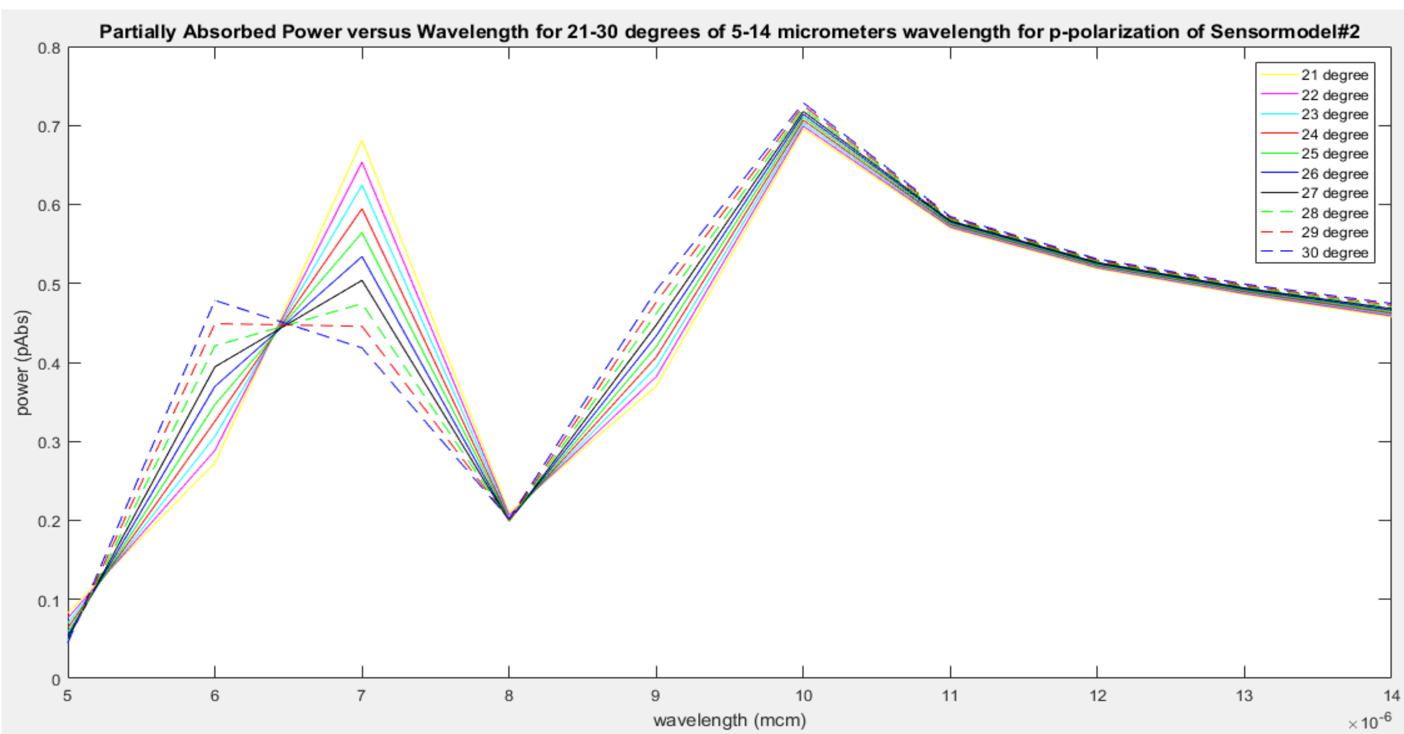


Figure 4-3-30 Partial Absorbed Power versus 5-14 μm wavelength for 21-30 degrees of p-polarization

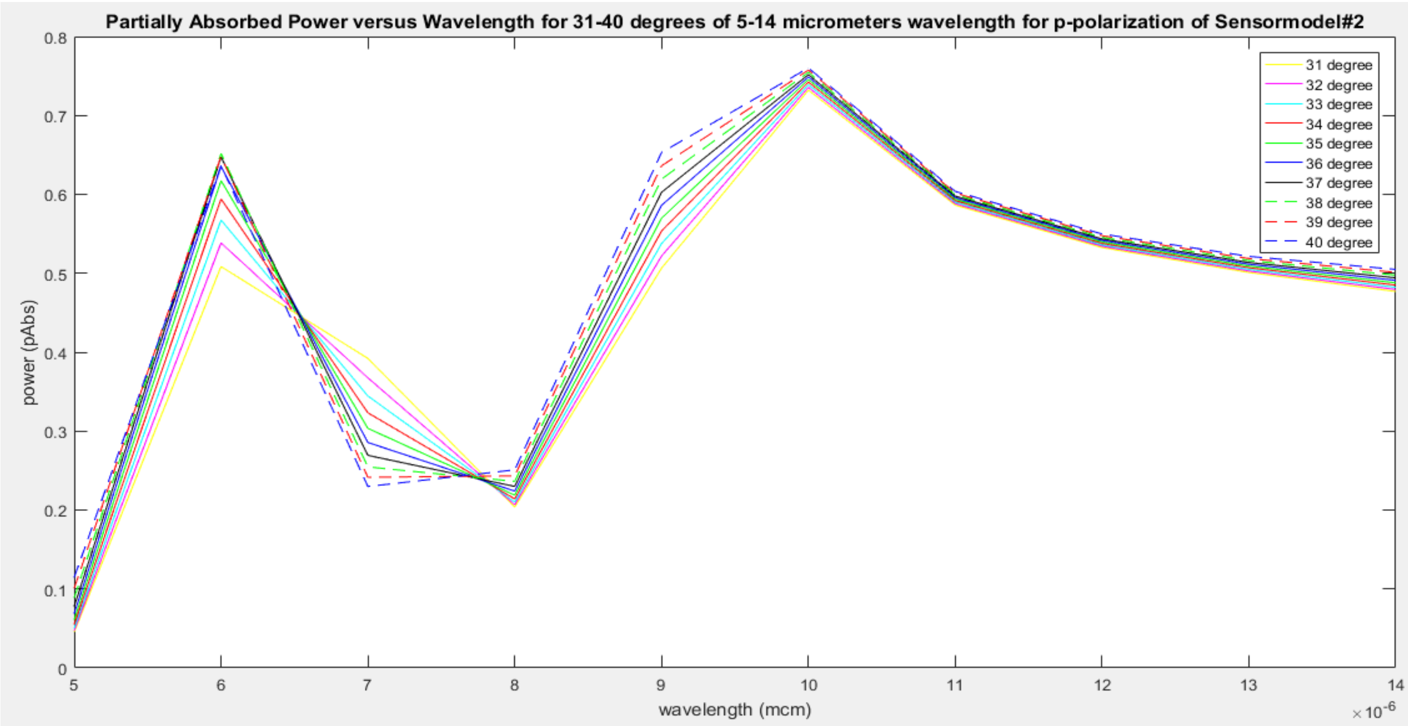


Figure 4-3-31 Partial Absorbed Power versus 5-14 µm wavelength for 31-40 degrees of p-polarization

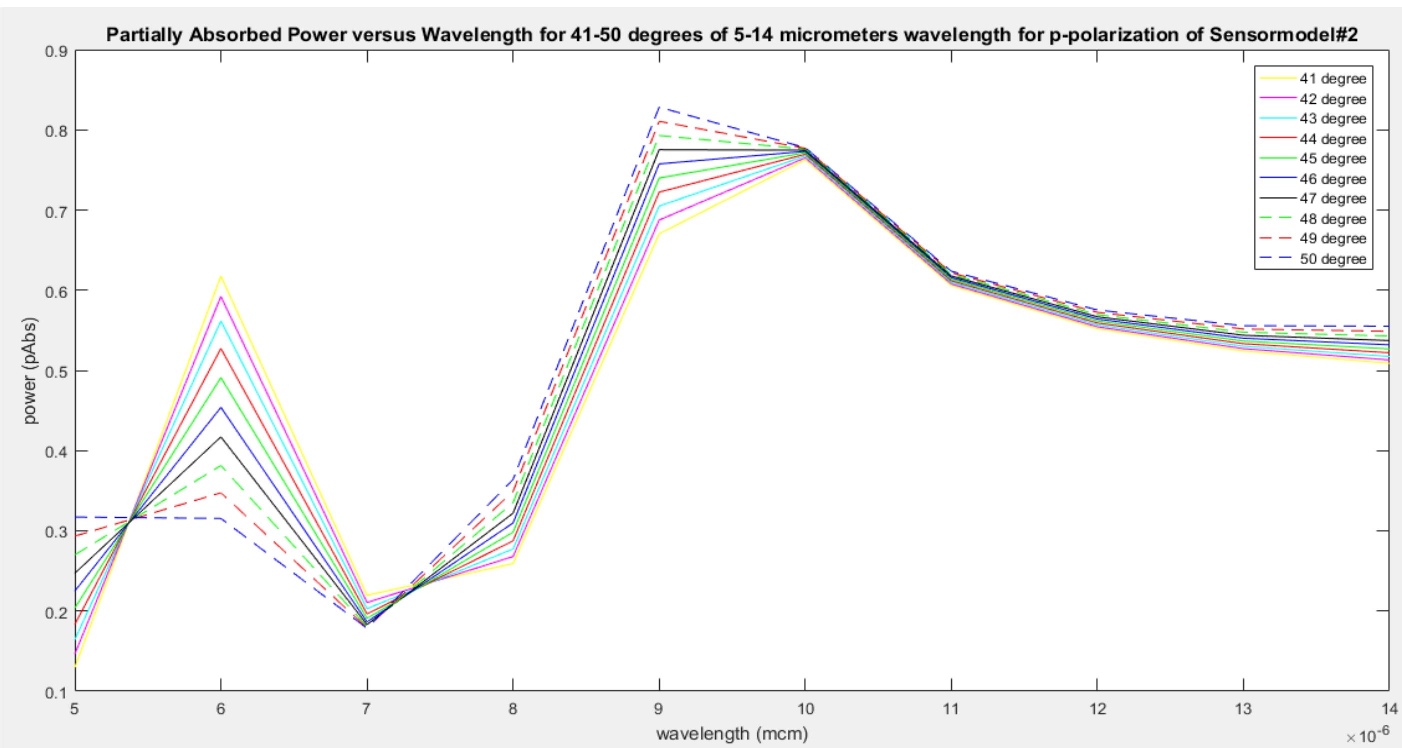


Figure 4-3-32 Partial Absorbed Power versus 5-14 µm wavelength for 41-50 degrees of p-polarization

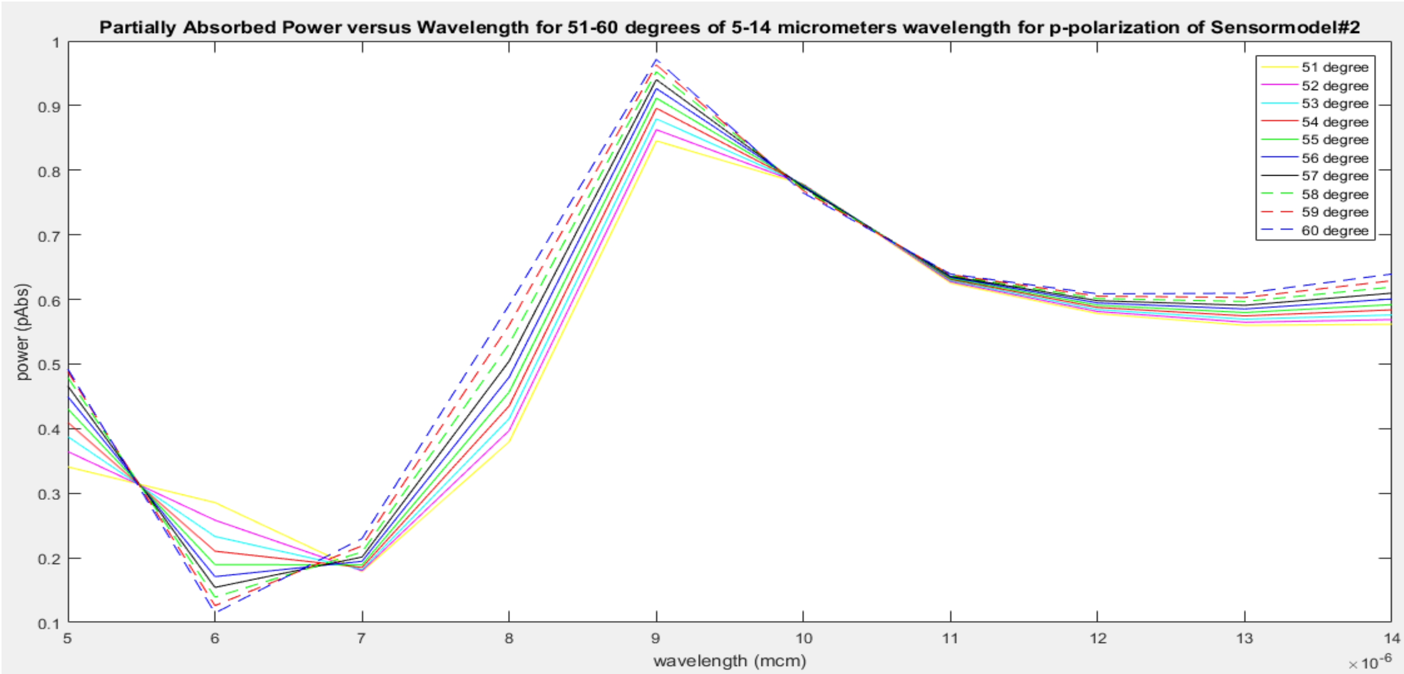


Figure 4-3-33 Partial Absorbed Power versus 5-14 μm wavelength for 51-60 degrees of p-polarization

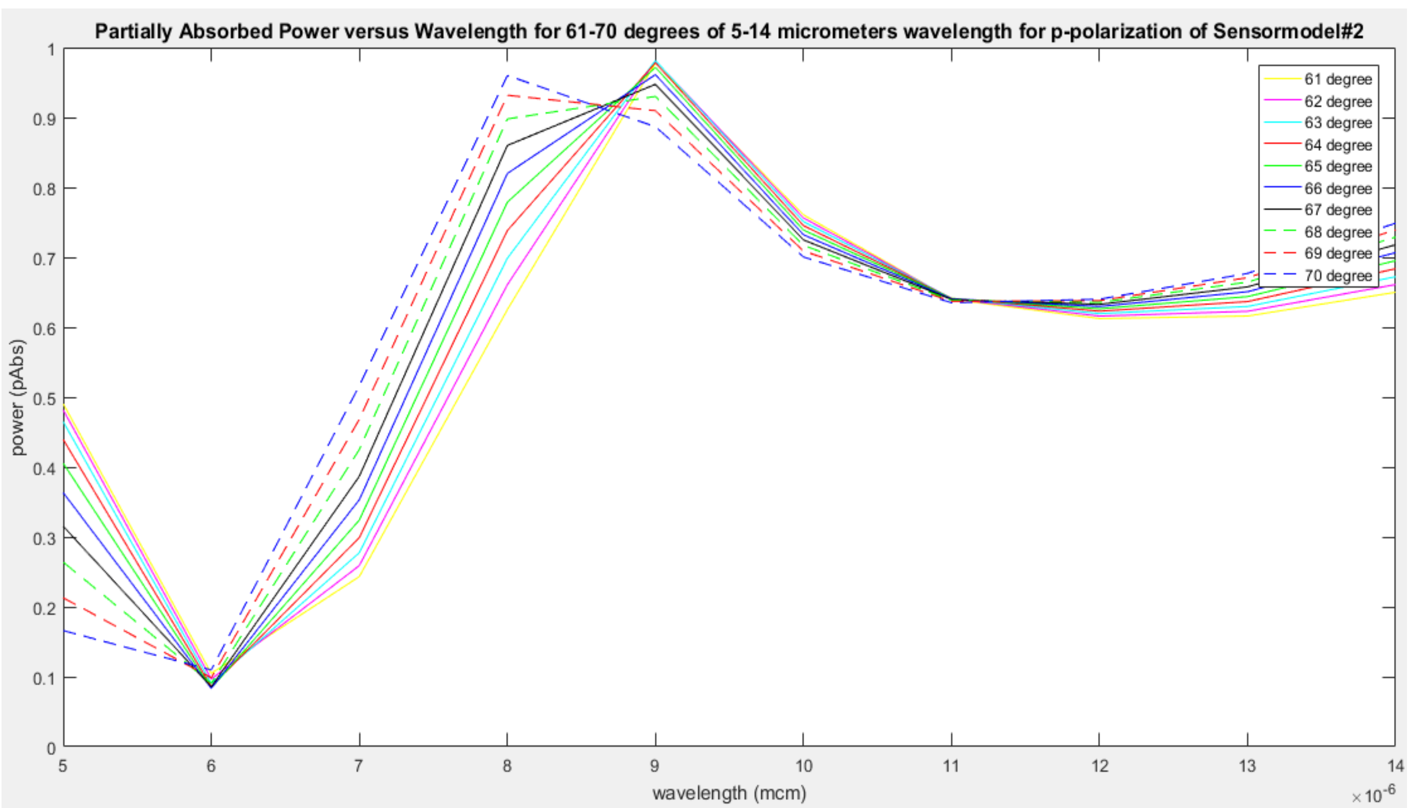


Figure 4-3-34 Partial Absorbed Power versus 5-14 μm wavelength for 61-70 degrees of p-polarization

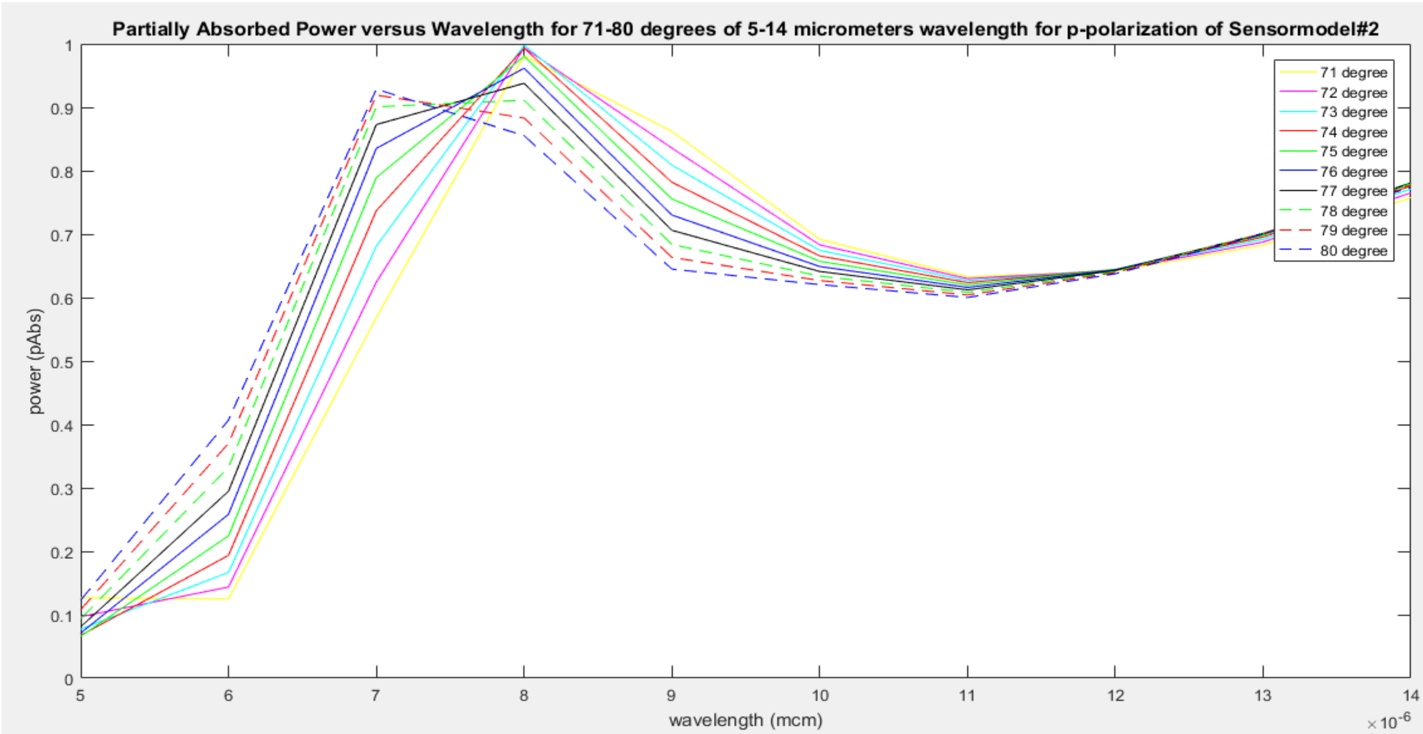


Figure 4-3-35 Partial Absorbed Power versus 5-14 µm wavelength for 71-80 degrees of p-polarization

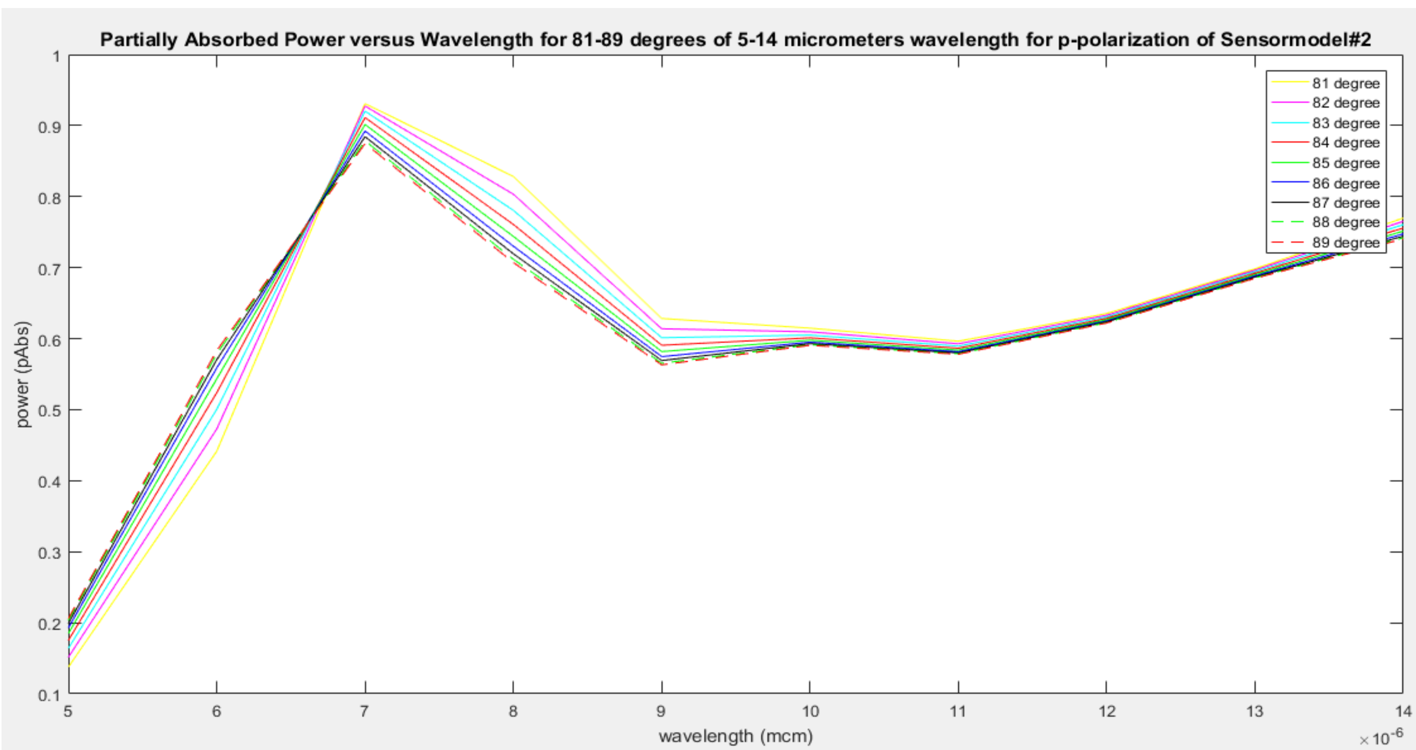


Figure 4-3-36 Partial Absorbed Power versus 5-14 µm wavelength for 81-89 degrees of p-polarization

4.3.1 Discussions

Table 4-3-1 comparison of maximum and minimum partial reflected power values at respective angles for s polarization across the wavelengths of 5-14 μm

Wavelength	Pr values of current model at oblique incidence (s-polarization) – Highest value	Pr values of current model at oblique incidence (s-polarization) – Least value
5 μm	0.9551→ 32^0	0.5236 → 51^0
6 μm	0.9242 → 63^0	0.3534 → 35^0
7 μm	0.8338 → 42^0	0.1113 → 1^0
8 μm	0.8161 → 24^0	0.1511 → 89^0
9 μm	0.7506 → 1^0	0.0383 → 66^0, 67^0
10 μm	0.3521 → 1^0	0.2683→ 39^0
11 μm	0.4467 → 1^0	0.4119 → 87^0, 88^0, 89^0
12 μm	0.4937 → 1^0	0.4355 → 89^0
13 μm	0.5264 → 1^0	0.4471 → 89^0
14 μm	0.5577 → 1^0	0.4490 → 89^0

Table 4-3-2 comparison of maximum and minimum partial reflected power values at respective angles for p polarization across the wavelengths of 5-14 μm

Wavelength	Pr values of current model at oblique incidence (p-polarization) – Highest value	Pr values of current model at oblique incidence (p-polarization) – Least value
5 μm	0.9551 → 30^0	0.5076 → 60^0
6 μm	0.9166 → 66^0	0.3483 → 38^0

7 µm	0.8215 → 50^0	0.0691 → 81^0
8 µm	0.8011 → 27^0	0.0021 → 73^0
9 µm	0.7506 → 1^0	0.0186 → 63^0
10 µm	0.4094 → 89^0	0.2217 → 54^0
11 µm	0.4467 → 1^0	0.3587 → 64^0
12 µm	0.4937 → 1^0	0.3555 → 74^0
13 µm	0.5264 → 1^0	0.2985 → 78^0
14 µm	0.5577 → 1^0	0.2190 → 77^0

Table 4-3-3 comparison of maximum and minimum partial absorbed power values at respective angles for s polarization across the wavelengths of 5-14 µm

Wavelength	Pabs values of current model at oblique incidence (s-polarization) – Highest value	Pabs values of current model at oblique incidence (s-polarization) – Least value
5 µm	0.4764 - 0.0000i → 51^0	0.0450 - 0.0000i → 33^0, 2^0
6 µm	0.6466 - 0.0000i → 35^0	0.0758 - 0.0000i → 63^0
7 µm	0.8887 - 0.0000i → 1^0	0.1662 - 0.0000i → 42^0
8 µm	0.8489 - 0.0000i → 89^0	0.1839 - 0.0000i → 24^0
9 µm	0.9617 - 0.0000i → 66^0, 67^0	0.2494 - 0.0000i → 1^0
10 µm	0.7317 - 0.0000i → 39^0	0.6479 - 0.0000i → 1^0
11 µm	0.5901 - 0.0000i → 58^0, 59^0, 60^0, 61^0, 62^0	0.5533 - 0.0000i → 1^0
12 µm	0.5645 - 0.0000i → 89^0	0.5063 - 0.0000i → 1^0
13 µm	0.5529 - 0.0000i → 89^0	0.4736 - 0.0000i → 1^0

14 µm	0.5510 - 0.0000i → 89^0	0.4423 - 0.0000i → 1^0

Table 4-3-4 comparison of maximum and minimum partial absorbed power values at respective angles for p polarization across the wavelengths of 5-14 µm

Wavelength	Pabs values of current model at oblique incidence (p-polarization) – Highest value	Pabs values of current model at oblique incidence (p-polarization) – Least value
5 µm	0.4924 - 0.0000i → 60^0	0.0454 - 0.0000i → 31^0
6 µm	0.6517 - 0.0000i → 38^0	0.0834 - 0.0000i → 66^0
7 µm	0.9309 - 0.0000i → 81^0	0.1785 - 0.0000i → 50^0
8 µm	0.9979 - 0.0000i → 73^0	0.1989 - 0.0000i → 27^0
9 µm	0.9814 - 0.0000i → 63^0	0.2494 - 0.0000i → 1^0
10 µm	0.7783 - 0.0000i → 52^0	0.5906 - 0.0000i → 89^0
11 µm	0.6413 - 0.0000i → 64^0	0.5533 - 0.0000i → 1^0
12 µm	0.6445 - 0.0000i → 74^0	0.5063 - 0.0000i → 1^0
13 µm	0.7015 - 0.0000i → 78^0	0.4736 - 0.0000i → 1^0
14 µm	0.7810 - 0.0000i → 77^0	0.4423 - 0.0000i → 1^0

In case of s-polarization in range of wavelengths from 5-14 µm the maximum values of absorbed power beginning from 0.4764-0.0000i (at 51^0 for 5 µm) reaches a peak at 0.9617-0.0000i at 66^0, 67^0 for wavelength of 9 µm and then progressively decreases ending at 0.5510-0.0000i at 89^0 for wavelength of 14 µm. In case of p-polarization in range of wavelengths from 5-14 µm the maximum values of absorbed power beginning from 0.4924-0.0000i (at 60^0 for 5 µm) reaches a peak at 0.9979-0.0000i at 73^0 for wavelength of 8 µm and then progressively decreases to 0.6413-0.0000i at 64^0 for wavelength of 11 µm followed by a progressive increase reaching a magnitude of 0.7810-0.0000i at 77^0 for wavelength of 14 µm. In case of normal incidence for design and optimization of the sensor model the authors had found that at wavelength of 10.6 µm, for an air gap of 3500 nm the absorption was 76%. In case of s-polarization we see for the wavelength of 10 µm and air gap of 3500 nm the maximum absorbed power was 0.7317-0.0000i at 39^0 angle of incidence. In case of p-polarization we see for the wavelength of 10 µm and air gap of 3500 nm the maximum absorbed power was 0.7783-0.0000i at 52^0 angle of incidence.

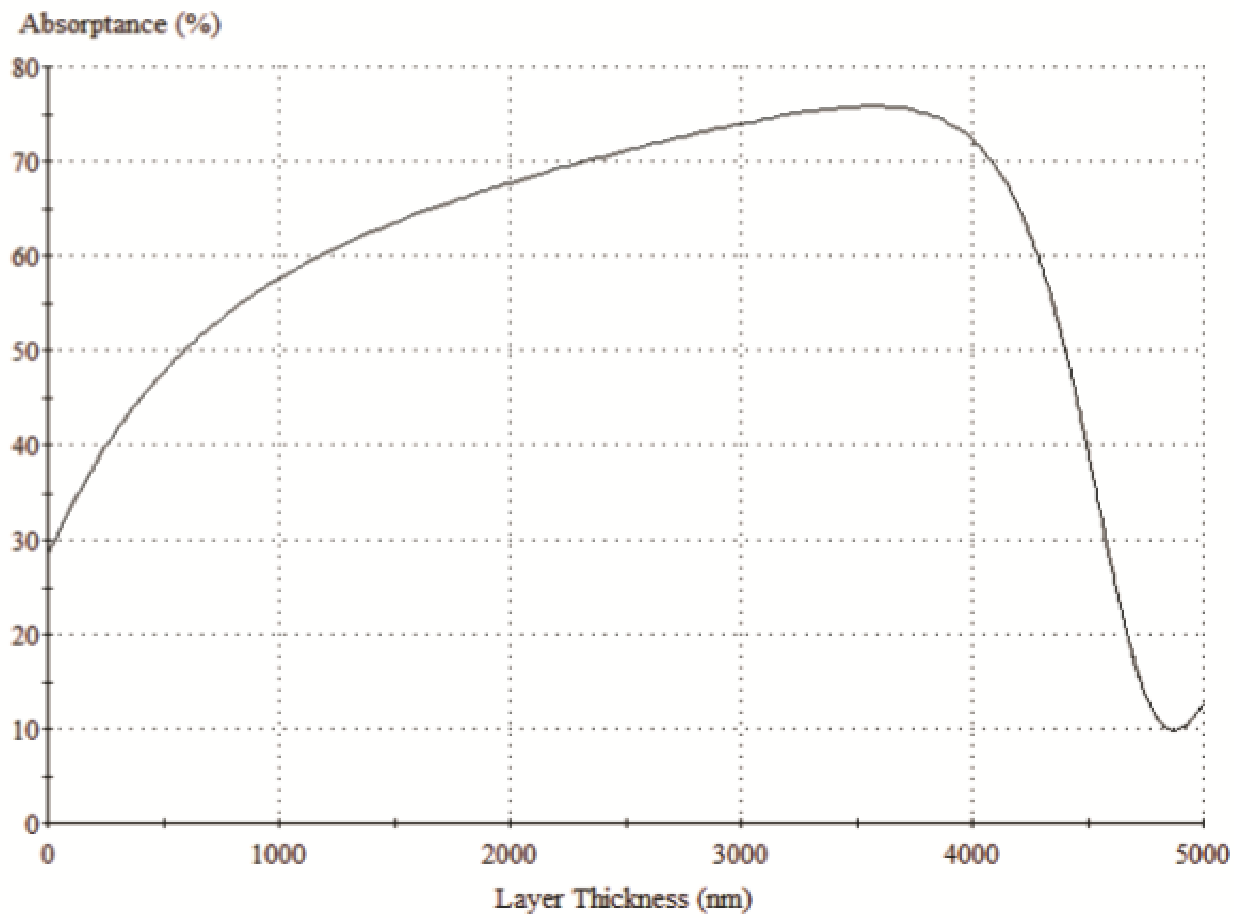


Figure 4-3-1-1 Absorbance versus Layer Thickness showing maximum absorbance of 76% for air gap thickness of 3500 nm at 10.6 µm wavelength of light

4.4 Results for Sensor Structure 3

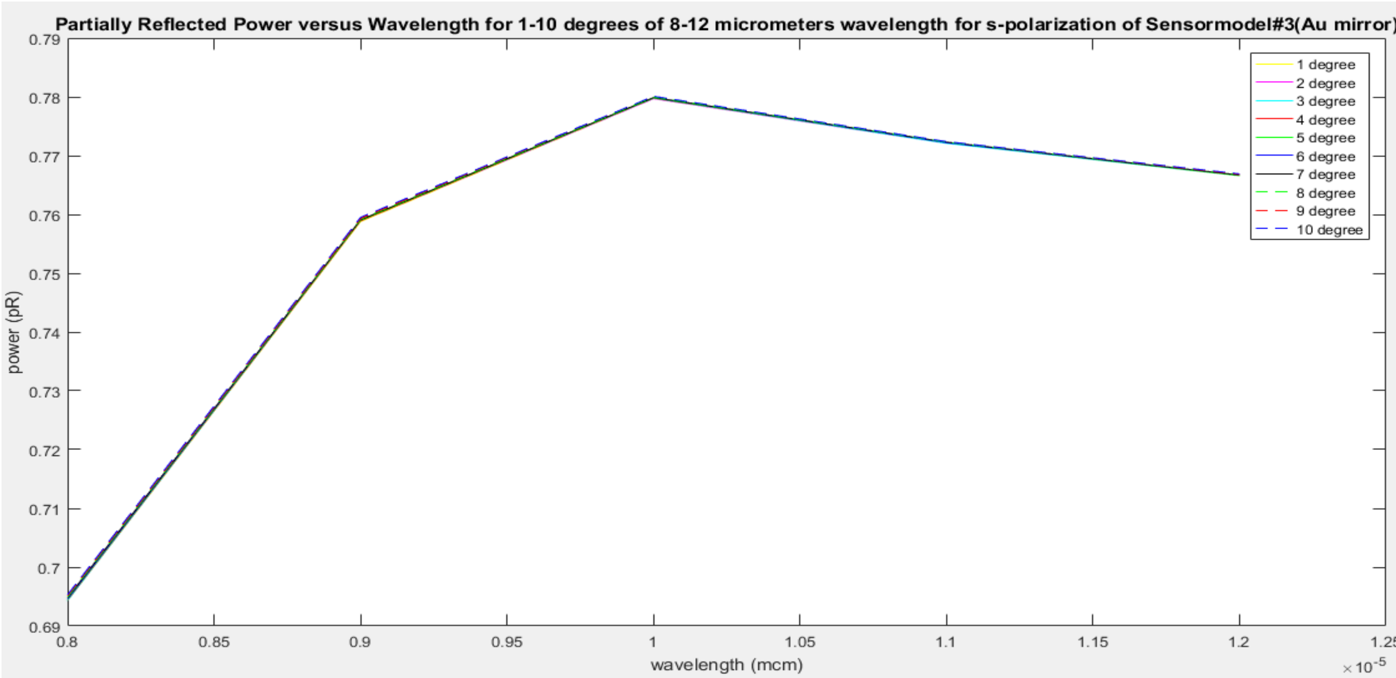


Figure 4-4-1 Partial Reflected Power versus 8-12 µm wavelength for 1-10 degrees of s-polarization

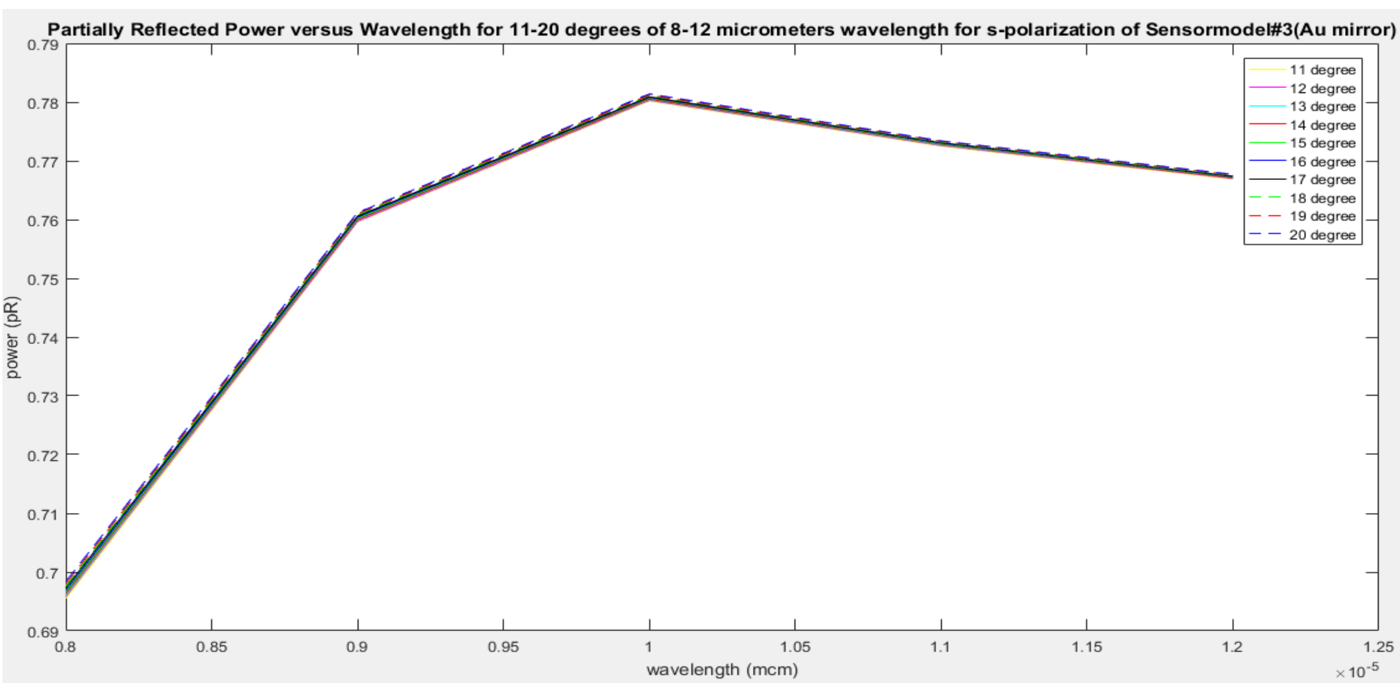


Figure 4-4-2 Partial Reflected Power versus 8-12 µm wavelength for 11-20 degrees of s-polarization

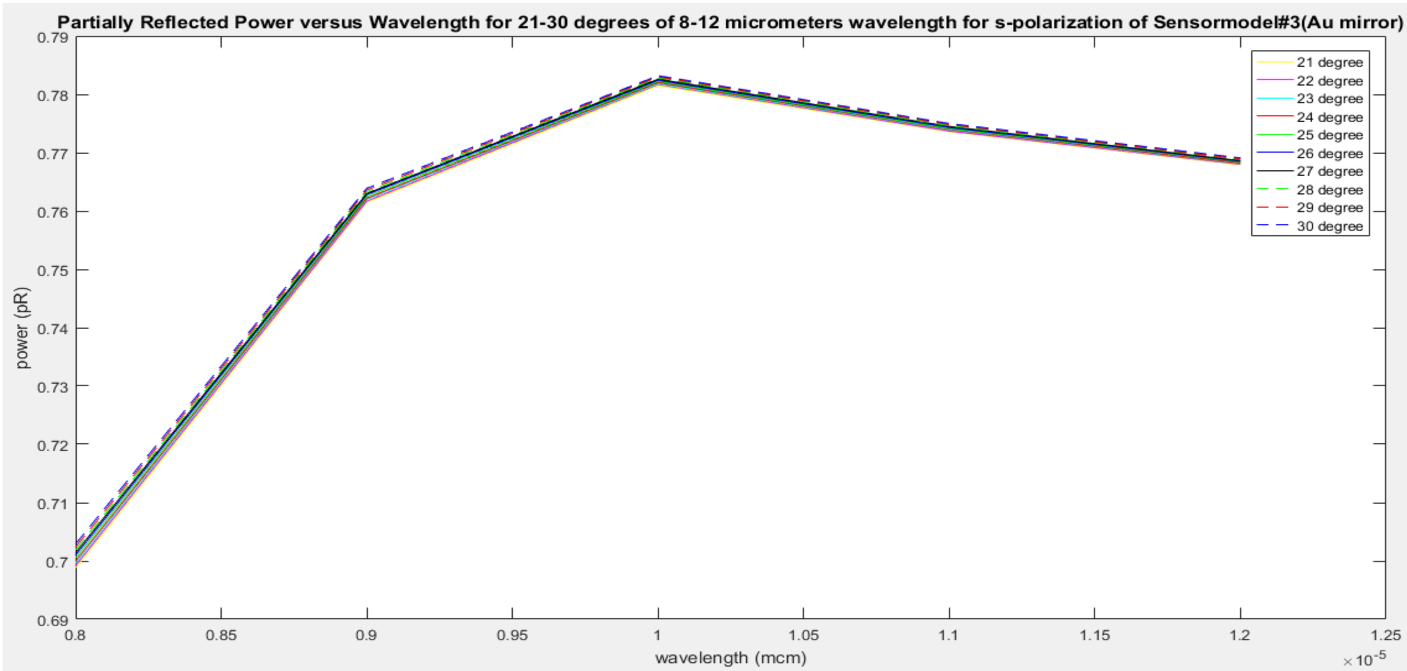


Figure 4-4-3 Partial Reflected Power versus 8-12 µm wavelength for 21-30 degrees of s-polarization

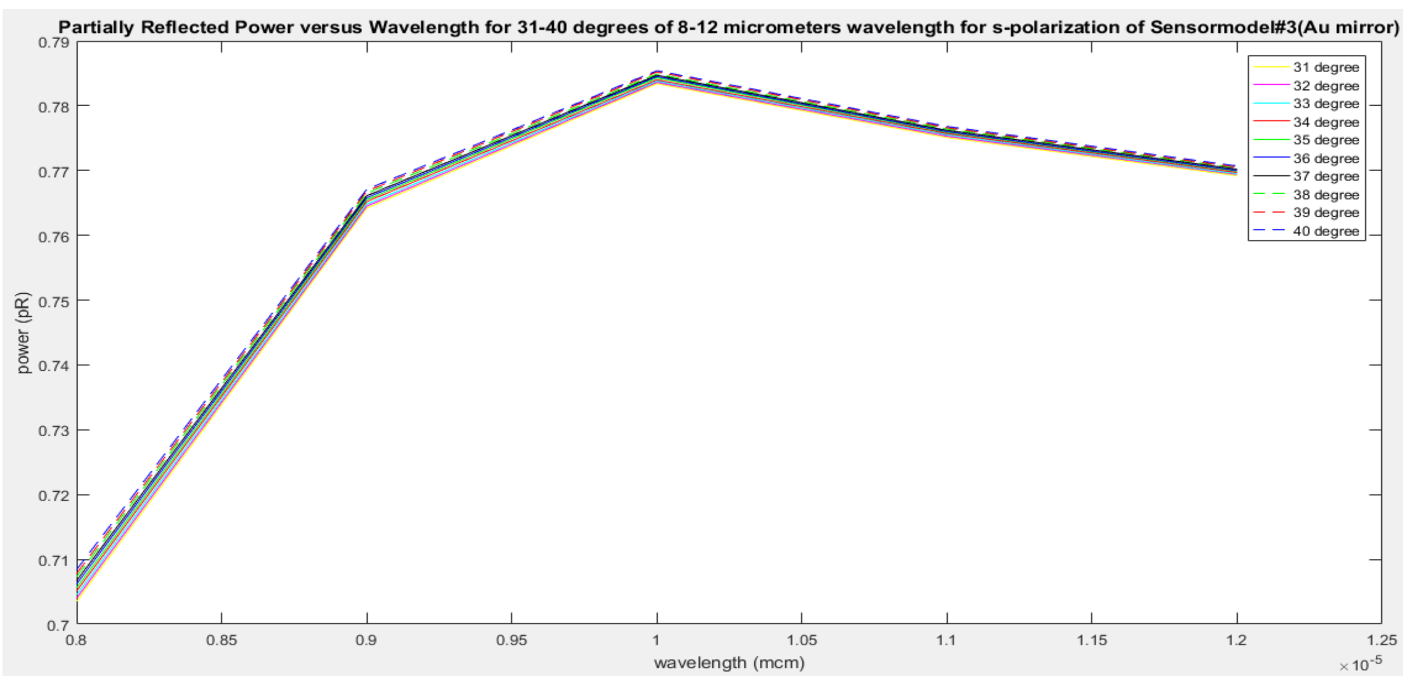


Figure 4-4-4 Partial Reflected Power versus 8-12 µm wavelength for 31-40 degrees of s-polarization

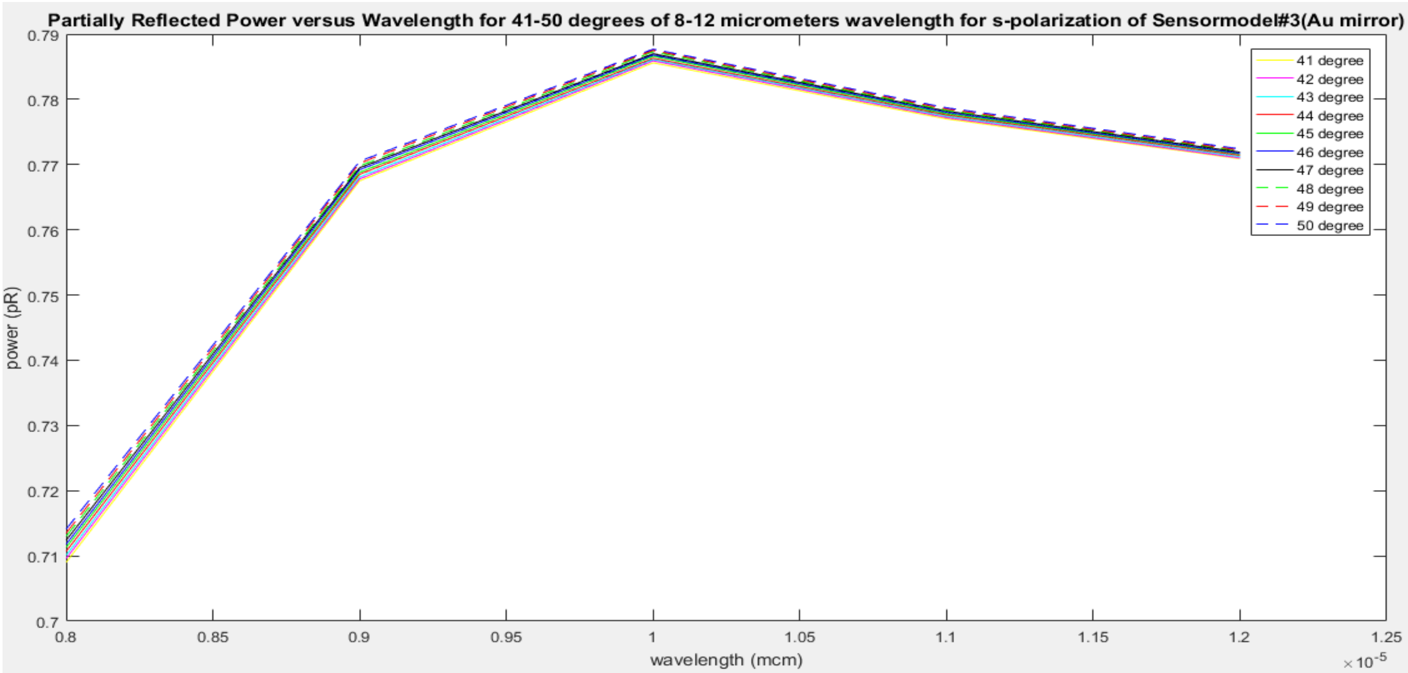


Figure 4-4-5 Partial Reflected Power versus 8-12 µm wavelength for 41-50 degrees of s-polarization

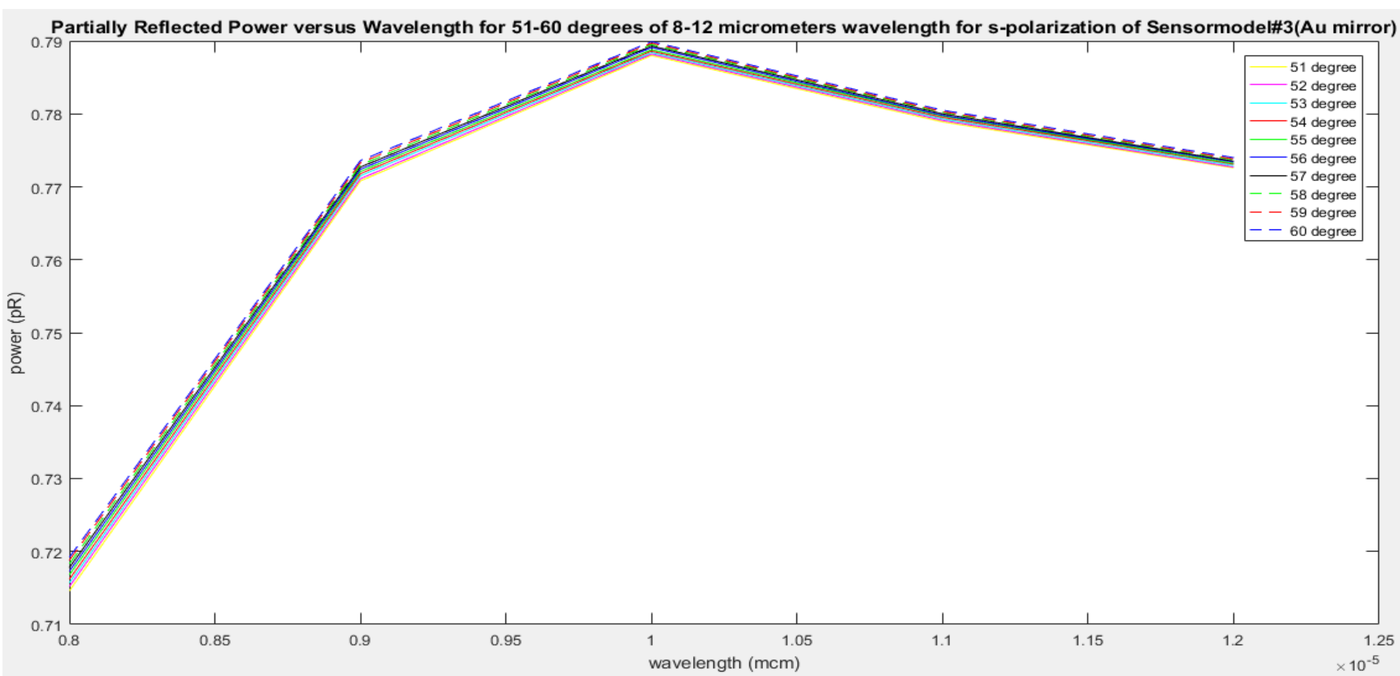


Figure 4-4-6 Partial Reflected Power versus 8-12 µm wavelength for 51-60 degrees of s-polarization

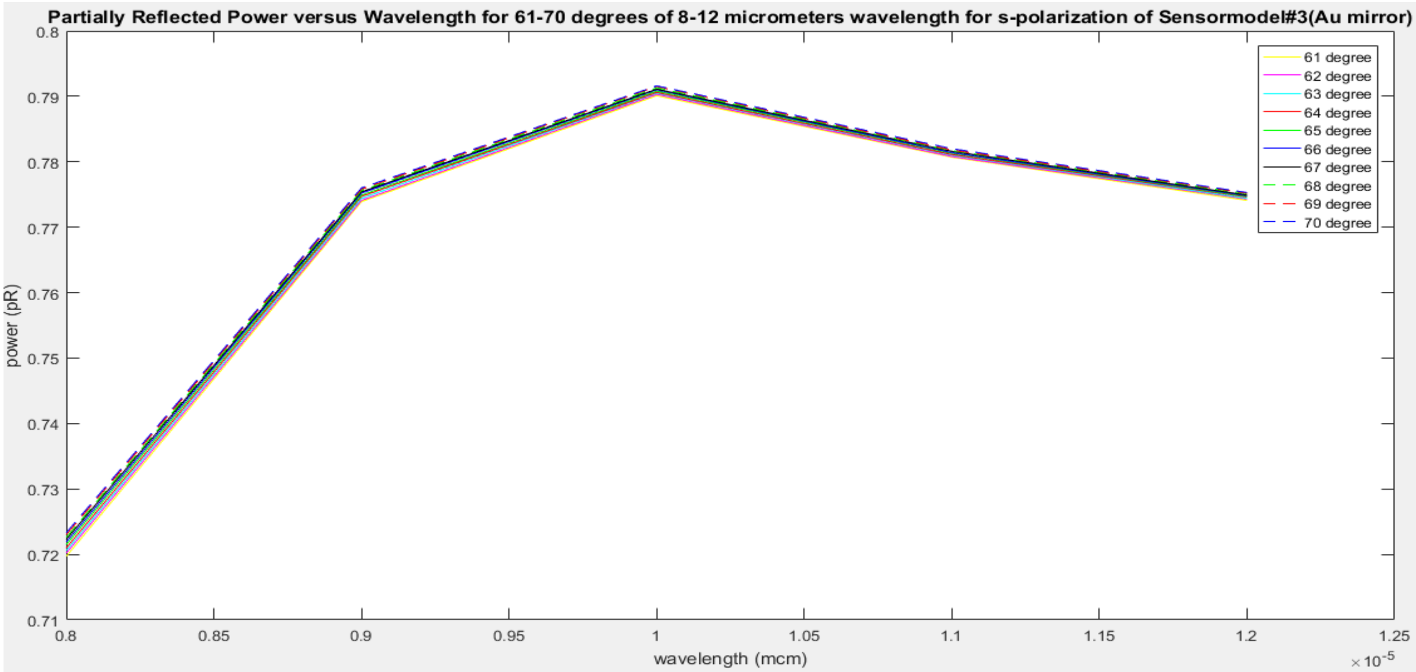


Figure 4-4-7 Partial Reflected Power versus 8-12 µm wavelength for 61-70 degrees of s-polarization

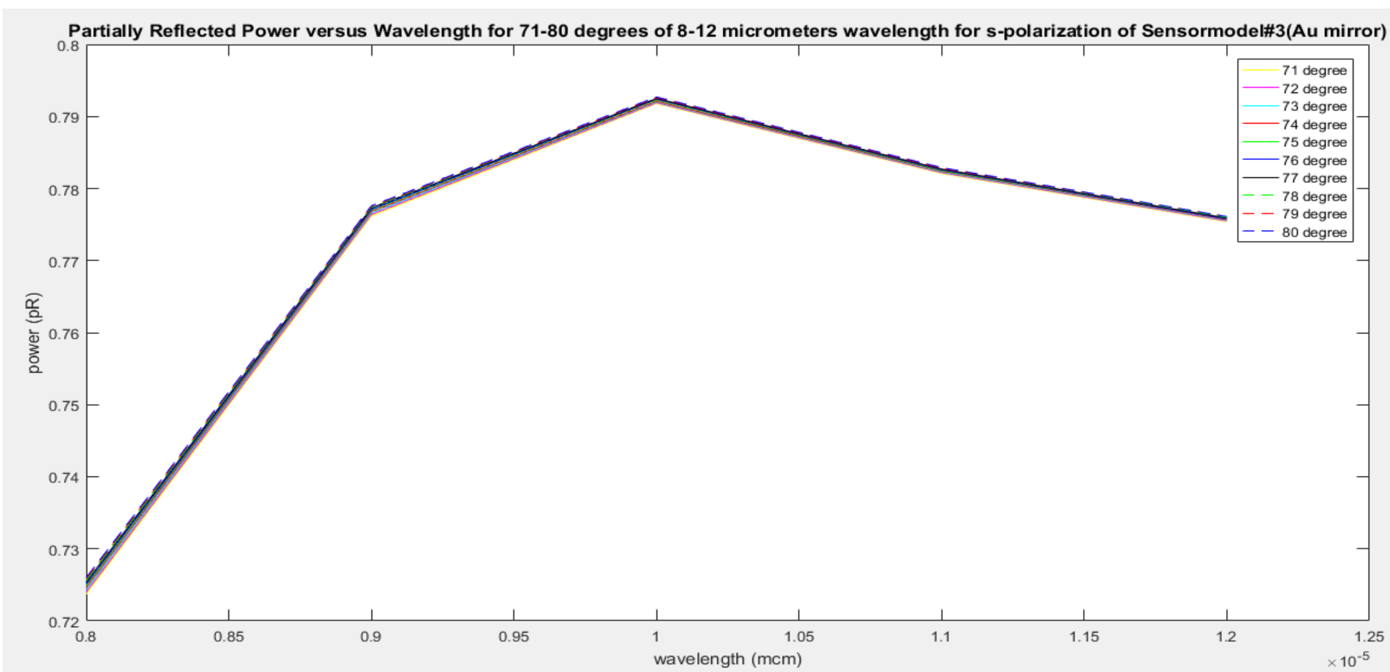


Figure 4-4-8 Partial Reflected Power versus 8-12 µm wavelength for 71-80 degrees of s-polarization

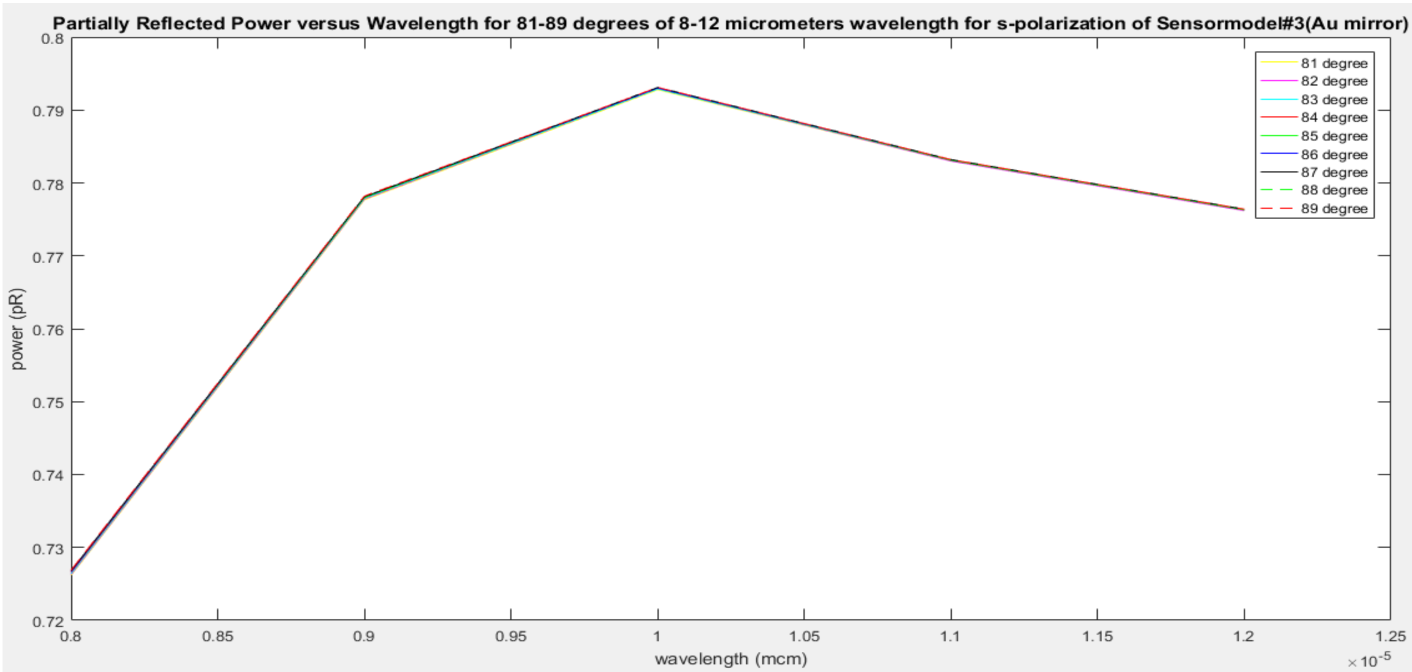


Figure 4-4-9 Partial Reflected Power versus 8-12 µm wavelength for 81-89 degrees of s-polarization

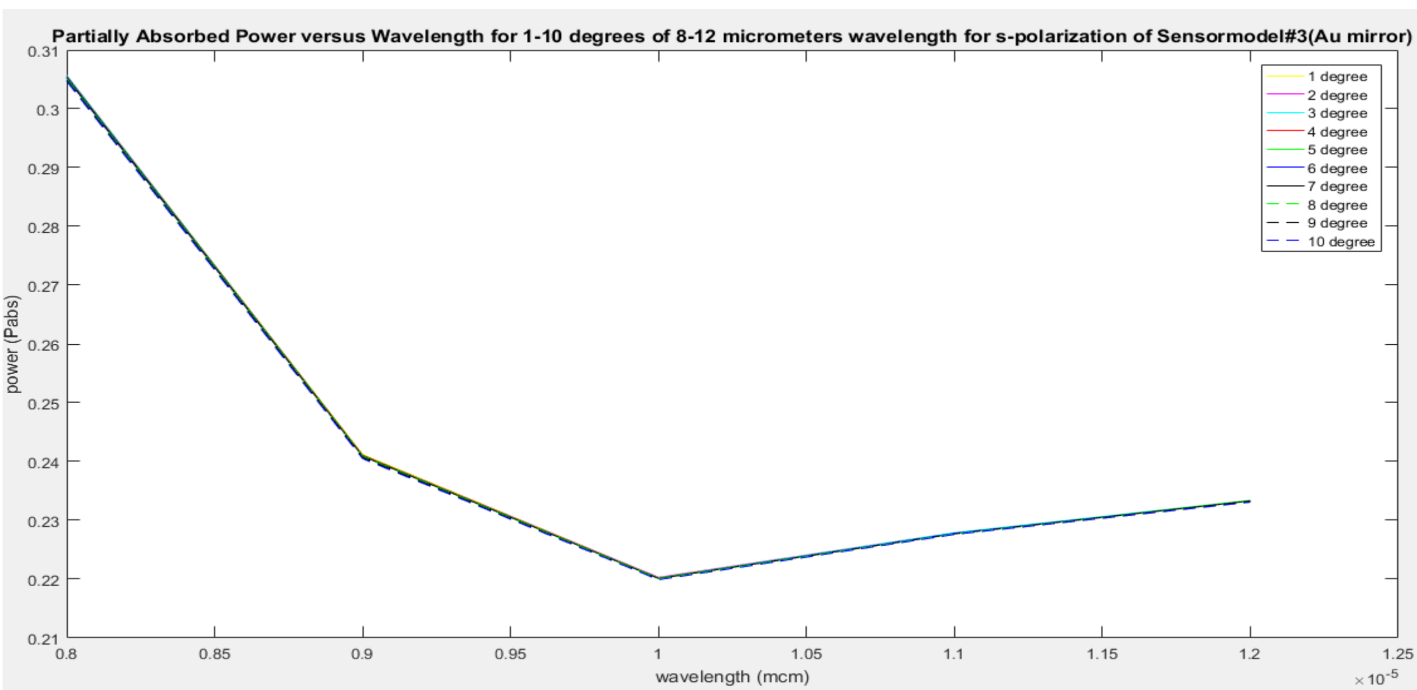


Figure 4-4-10 Partial Absorbed Power versus 5-14 µm wavelength for 1-10 degrees of s-polarization

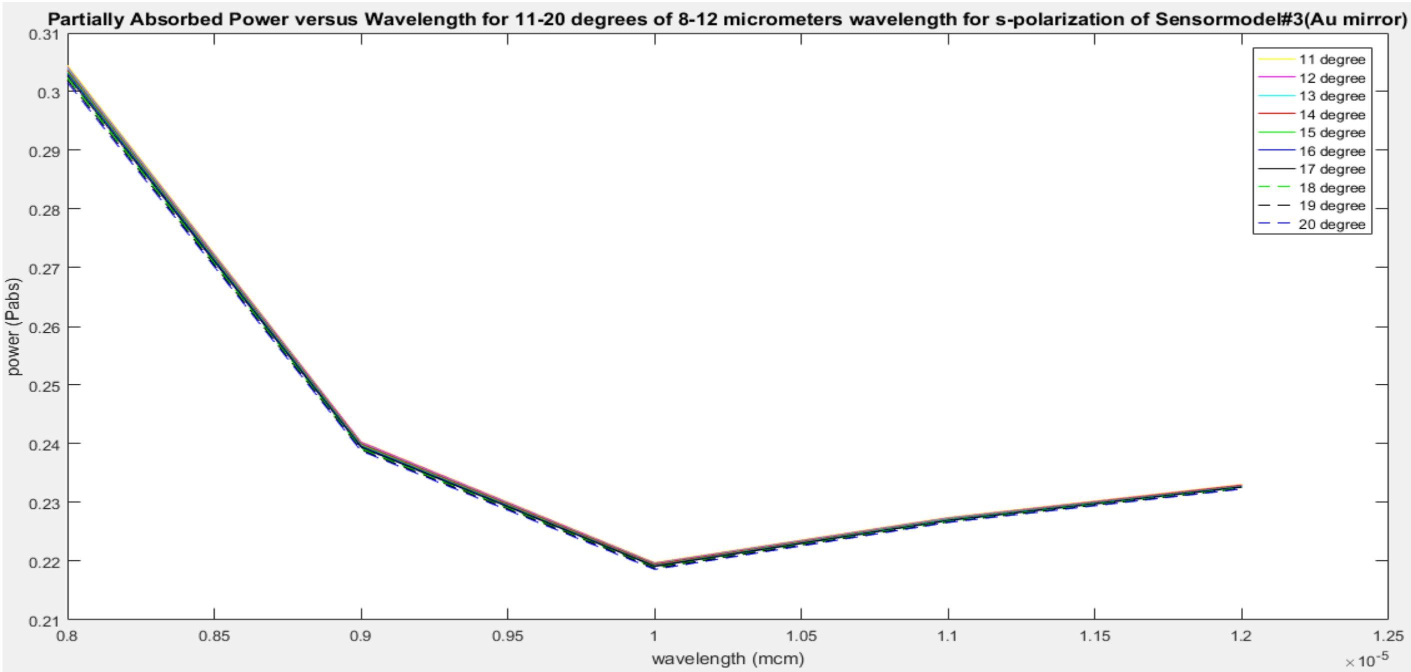


Figure 4-4-11 Partial Absorbed Power versus 8-12 µm wavelength for 11-20 degrees of s-polarization

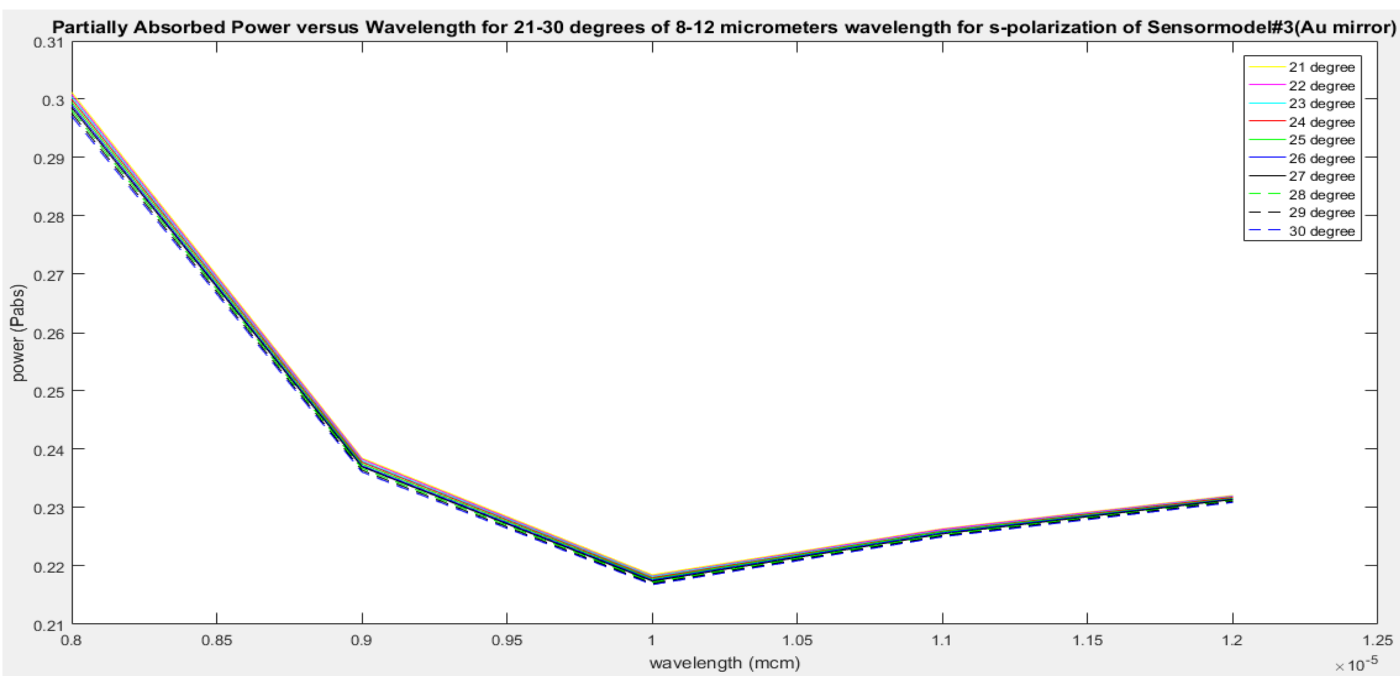


Figure 4-4-12 Partial Absorbed Power versus 8-12 µm wavelength for 21-30 degrees of s-polarization

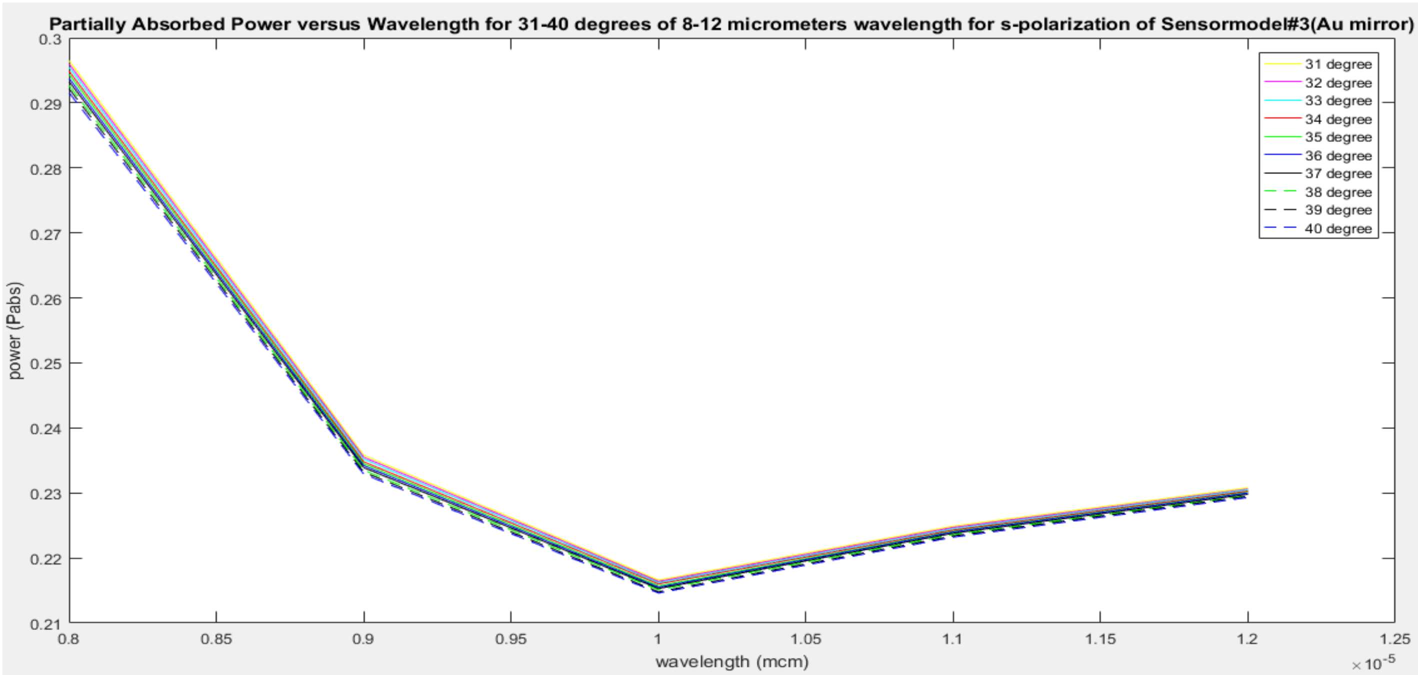


Figure 4-4-13 Partial Absorbed Power versus 8-12 µm wavelength for 31-40 degrees of s-polarization

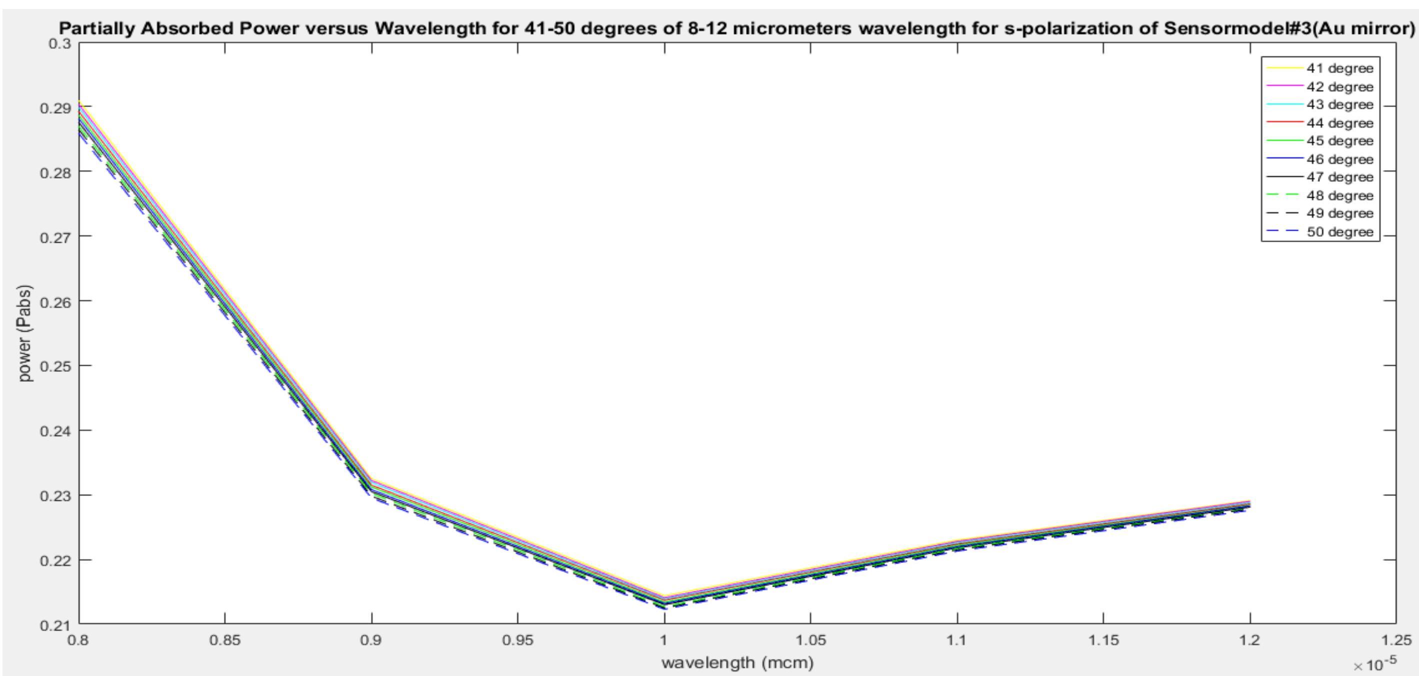


Figure 4-4-14 Partial Absorbed Power versus 8-12 µm wavelength for 41-50 degrees of s-polarization

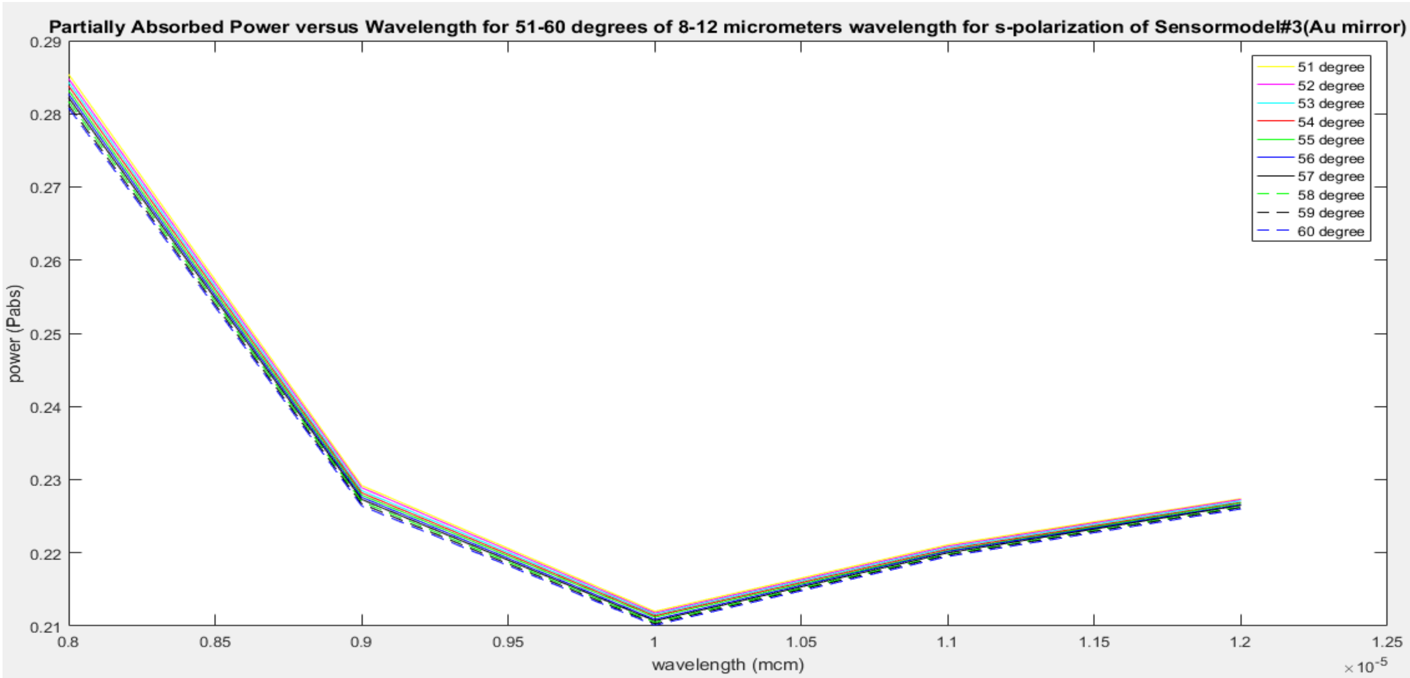


Figure 4-4-15 Partial Absorbed Power versus 8-12 µm wavelength for 51-60 degrees of s-polarization

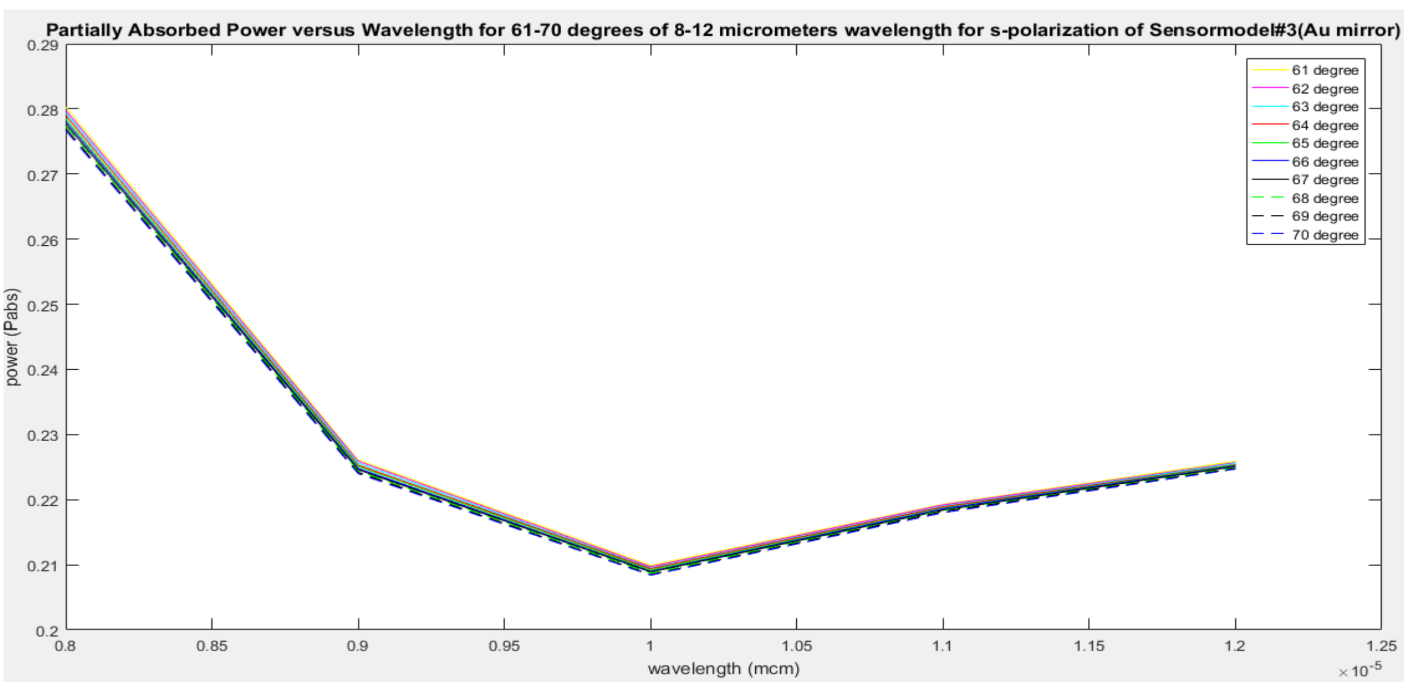


Figure 4-4-16 Partial Absorbed Power versus 8-12 µm wavelength for 61-70 degrees of s-polarization

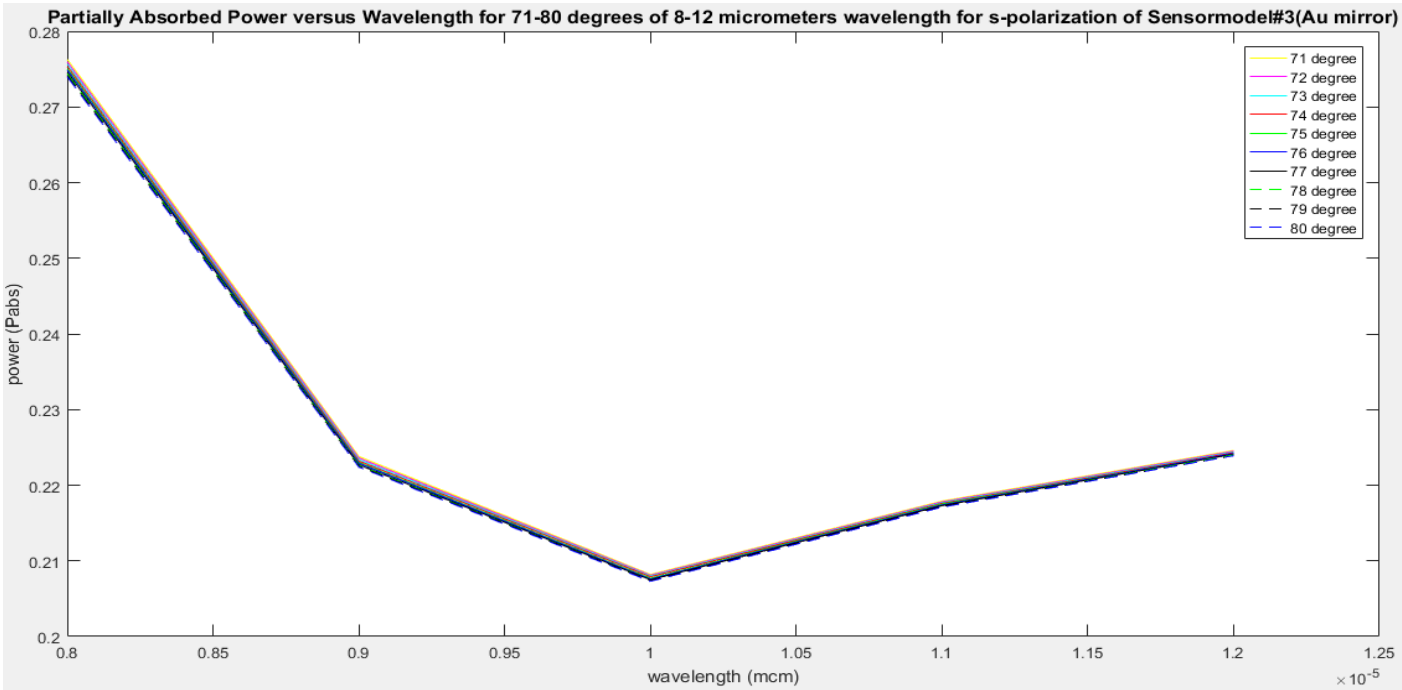


Figure 4-4-17 Partial Absorbed Power versus 8-12 µm wavelength for 71-80 degrees of s-polarization

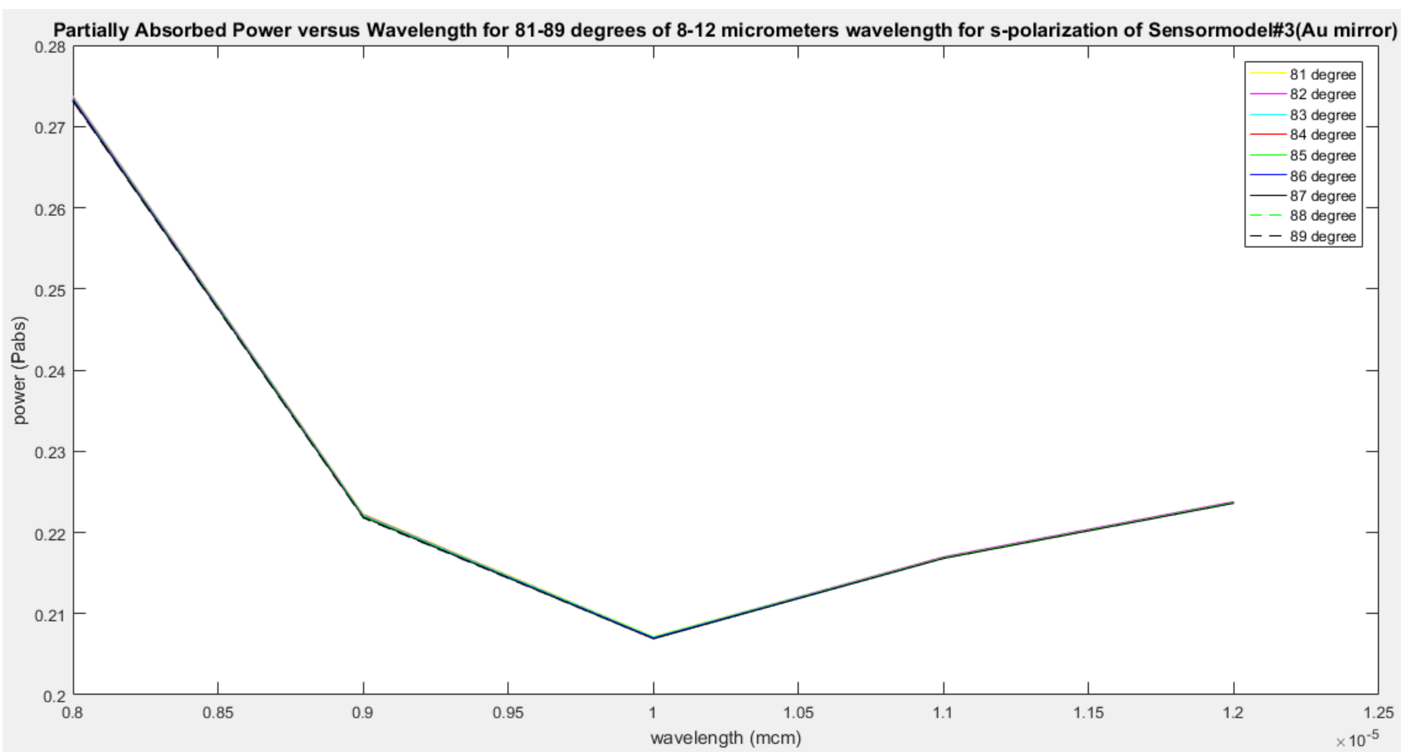


Figure 4-4-18 Partial Absorbed Power versus 8-12 µm wavelength for 81-89 degrees of s-polarization

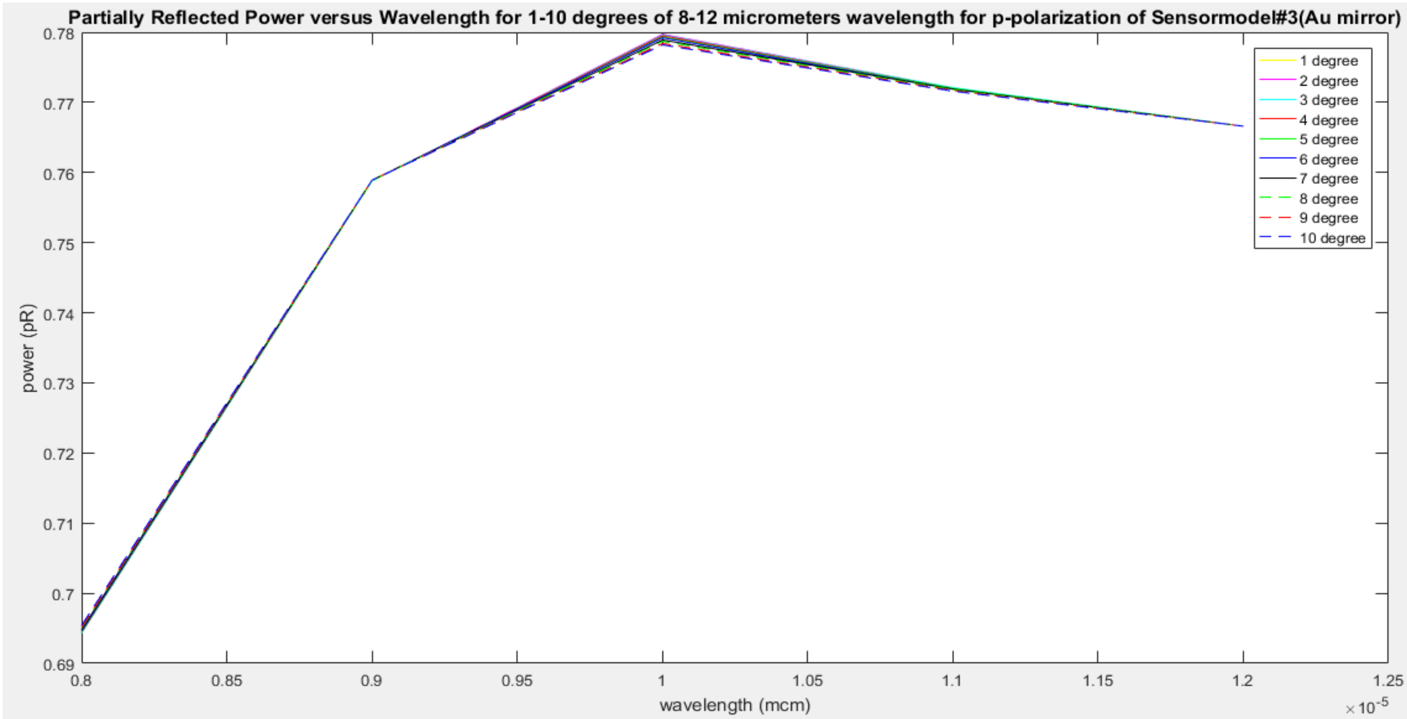


Figure 4-4-19 Partial Reflected Power versus 8-12 μm wavelength for 1-10 degrees of p-polarization

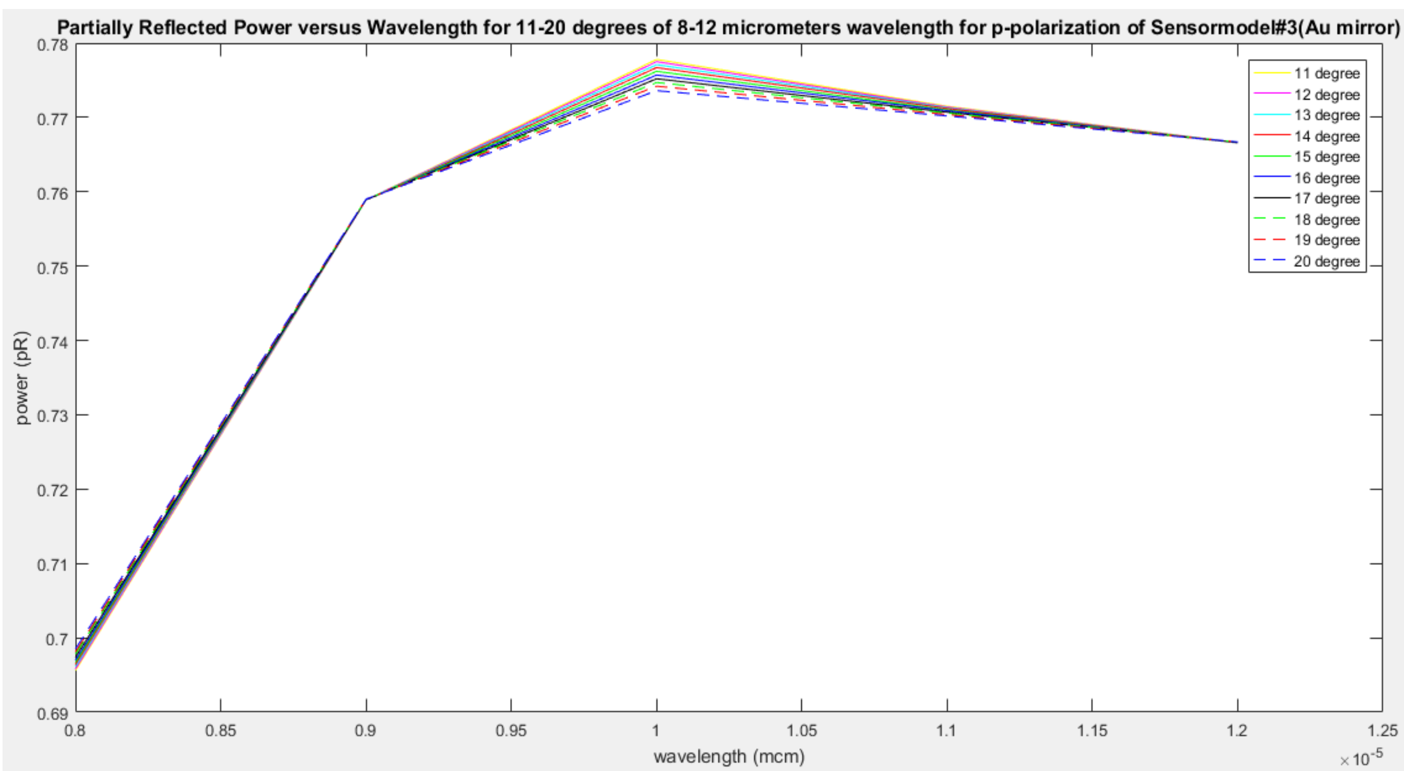


Figure 4-4-20 Partial Reflected Power versus 5-14 μm wavelength for 11-20 degrees of p-polarization

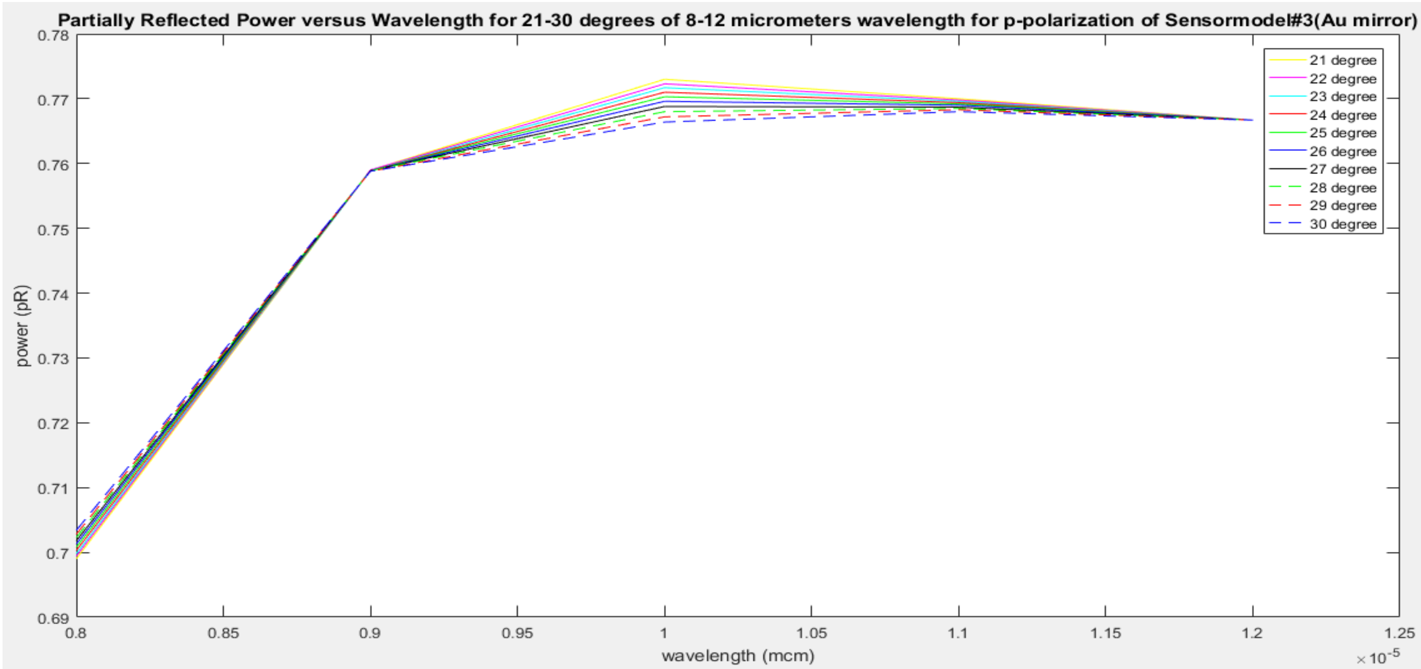


Figure 4-4-21 Partial Reflected Power versus 8-12 µm wavelength for 21-30 degrees of p-polarization

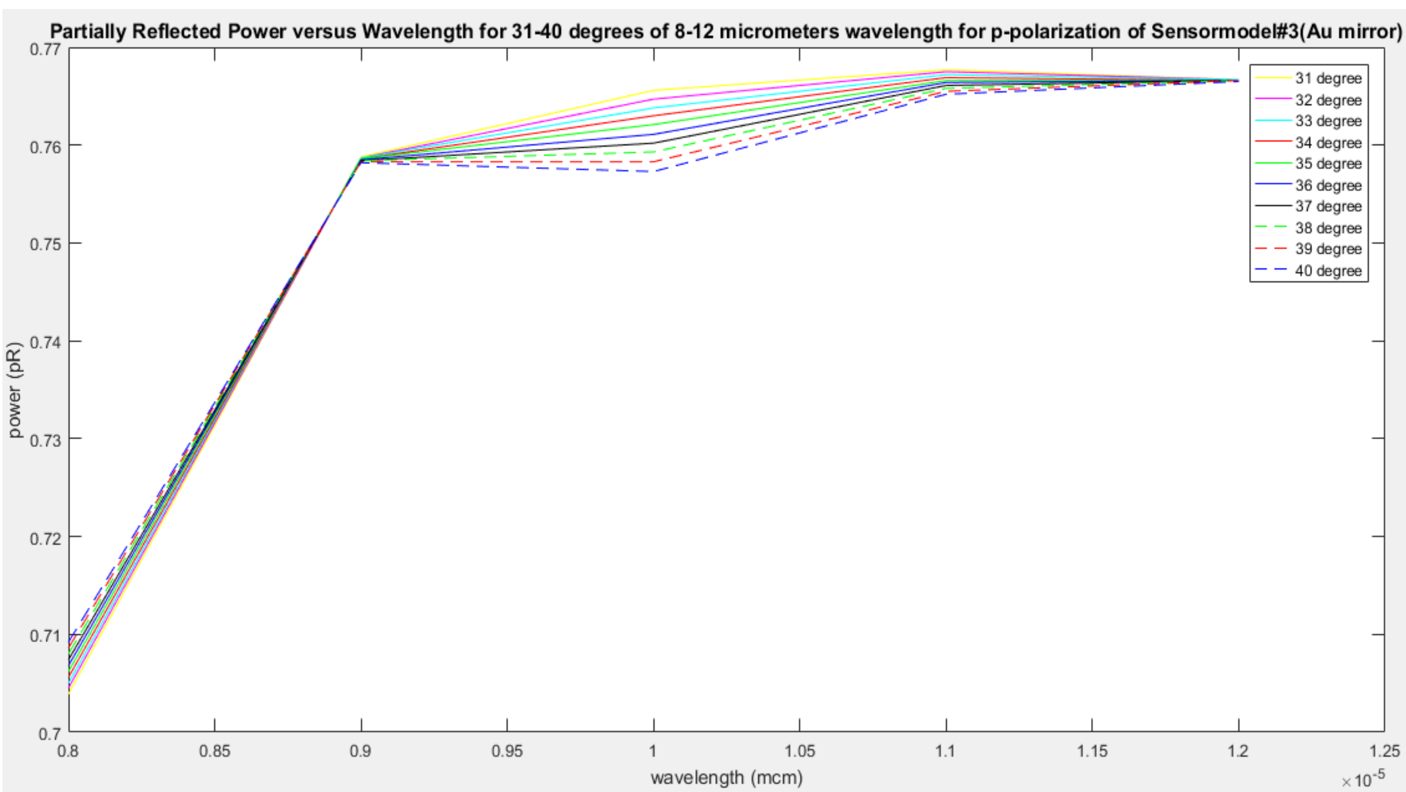


Figure 4-4-22 Partial Reflected Power versus 8-12 µm wavelength for 31-40 degrees of p-polarization

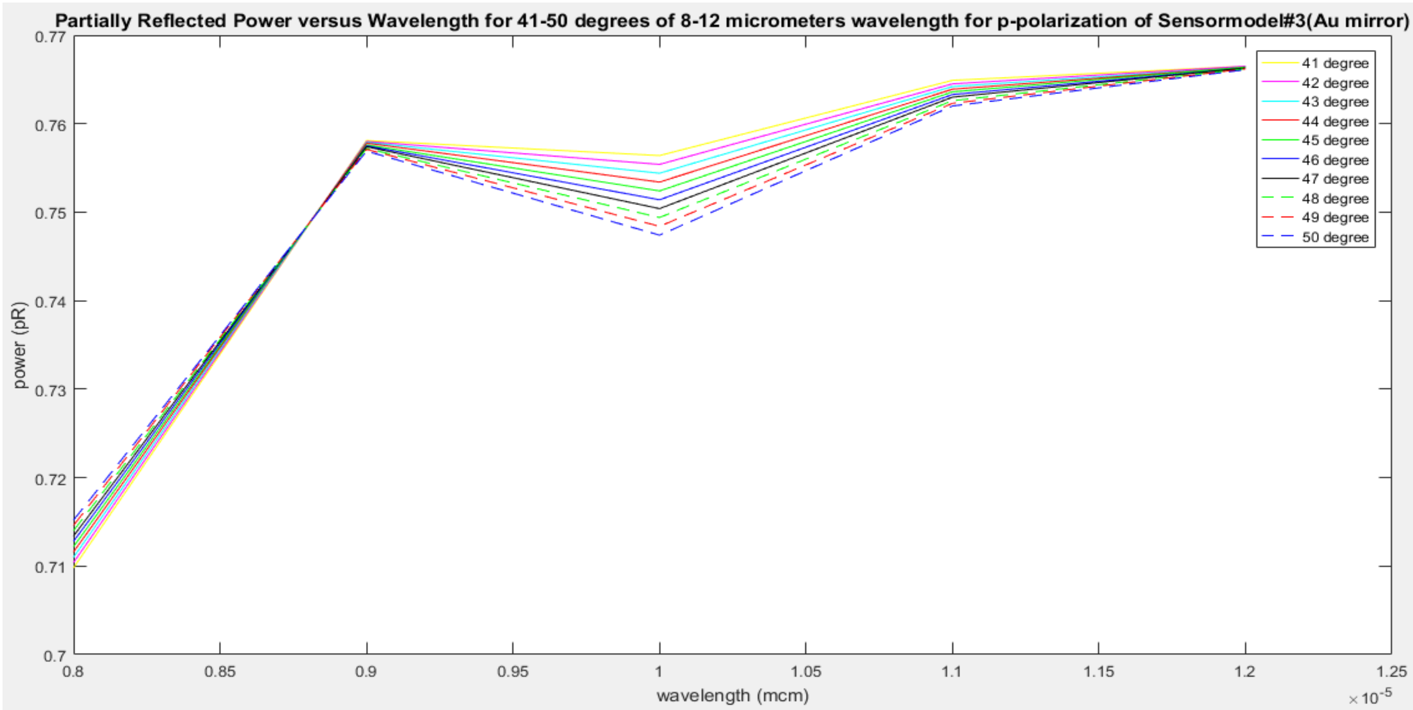


Figure 4-4-23 Partial Reflected Power versus 8-12 µm wavelength for 41-50 degrees of p-polarization

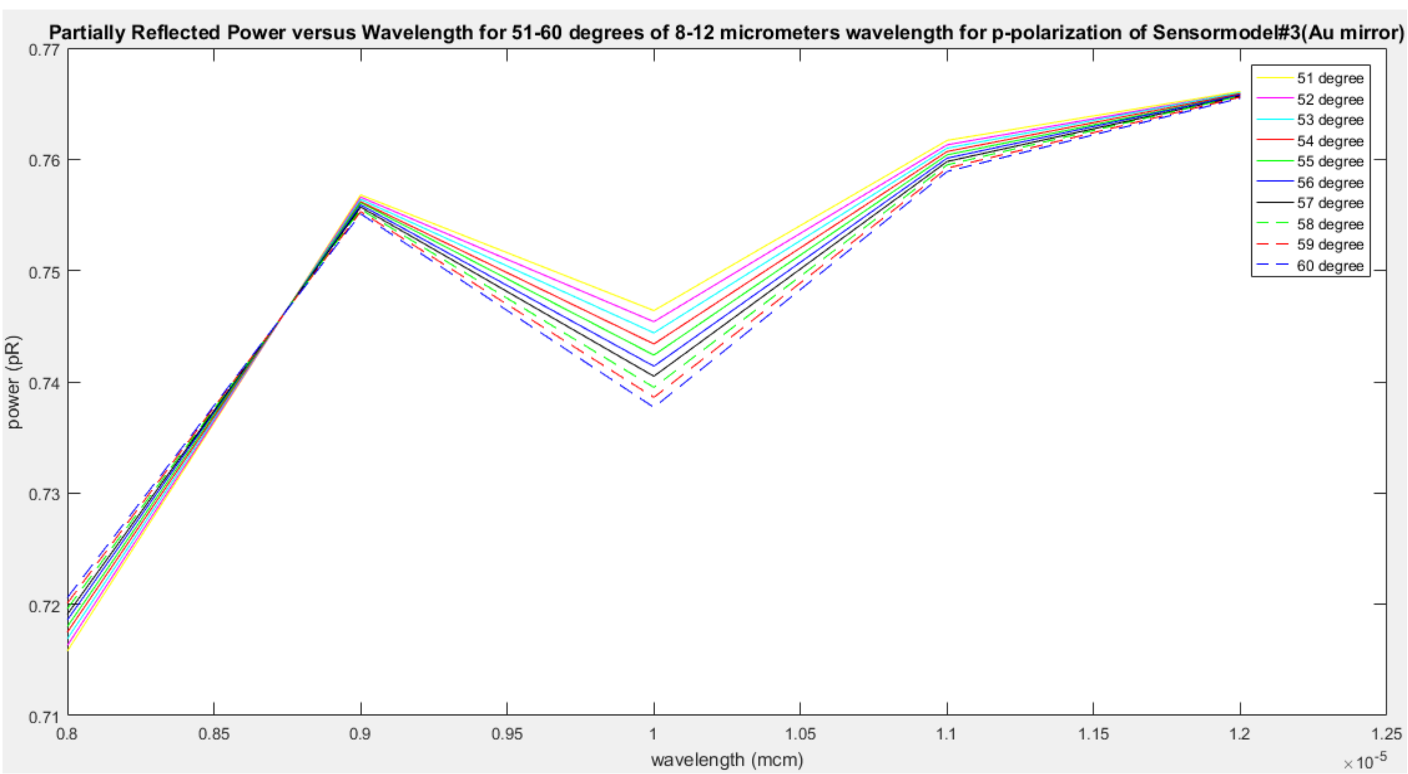


Figure 4-4-24 Partial Reflected Power versus 8-12 µm wavelength for 51-60 degrees of p-polarization

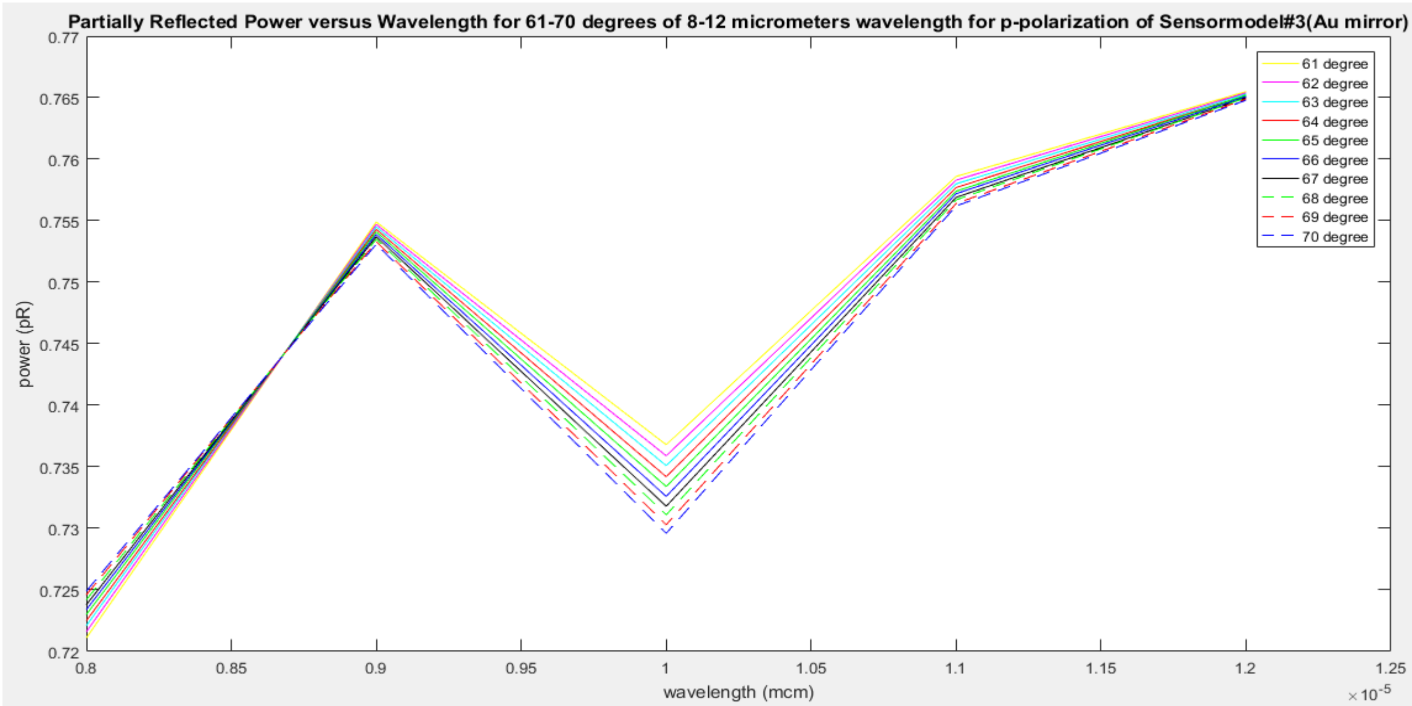


Figure 4-4-25 Partial Reflected Power versus 8-12 μm wavelength for 61-70 degrees of p-polarization

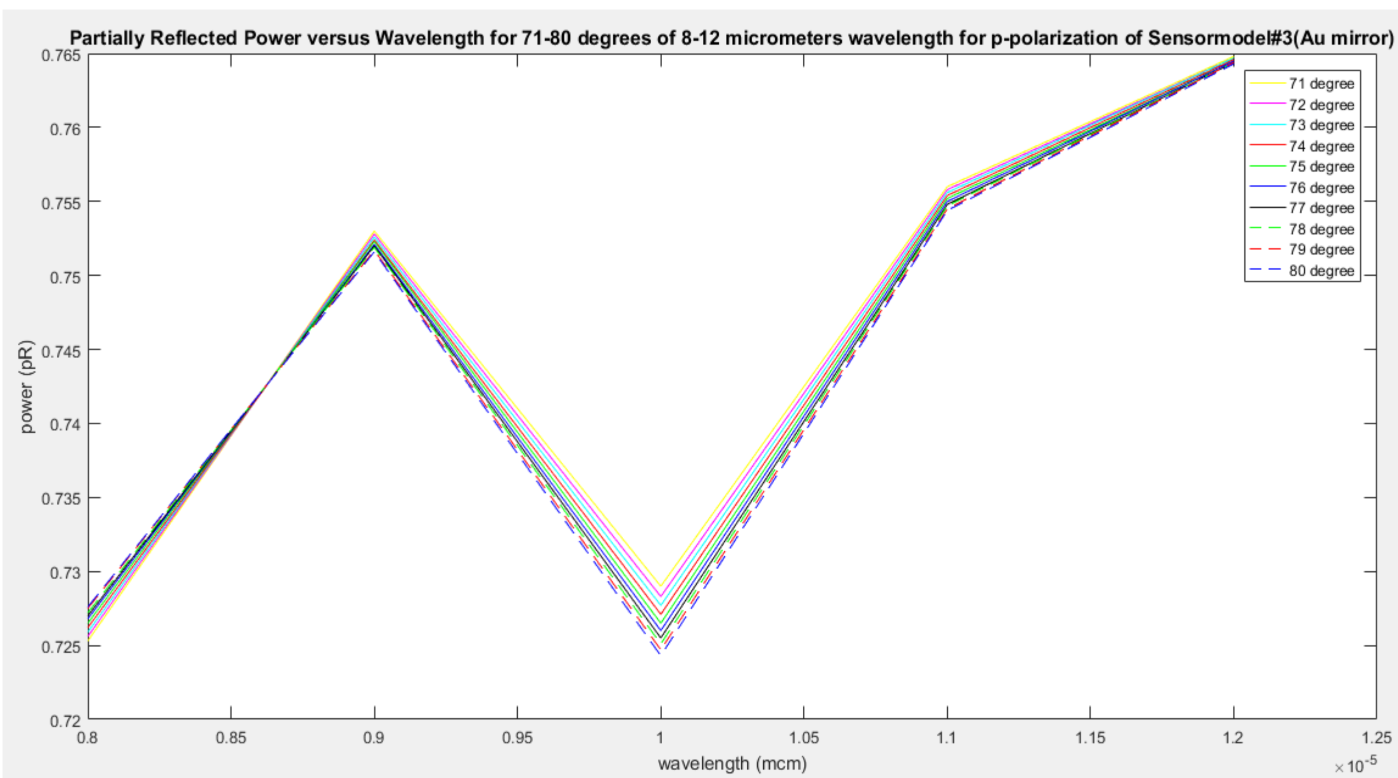


Figure 4-4-26 Partial Reflected Power versus 8-12 μm wavelength for 71-80 degrees of p-polarization

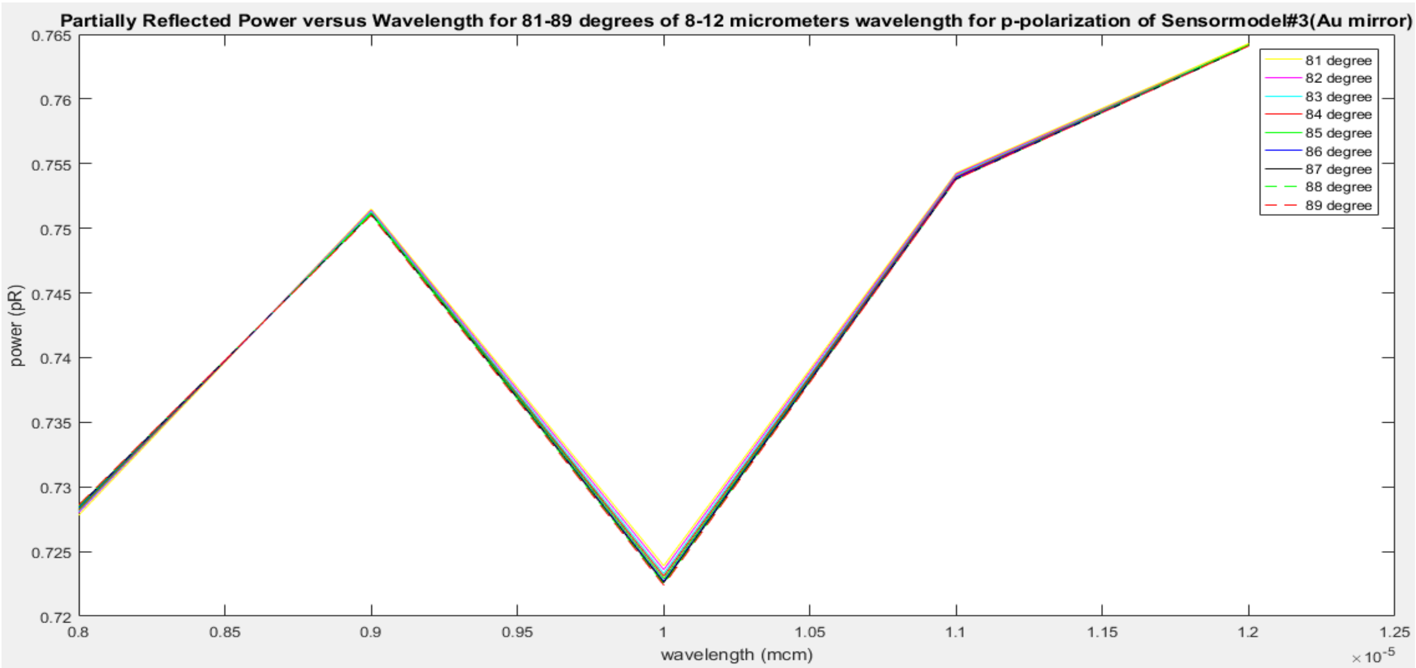


Figure 4-4-27 Partial Reflected Power versus 8-12 μm wavelength for 81-89 degrees of p-polarization

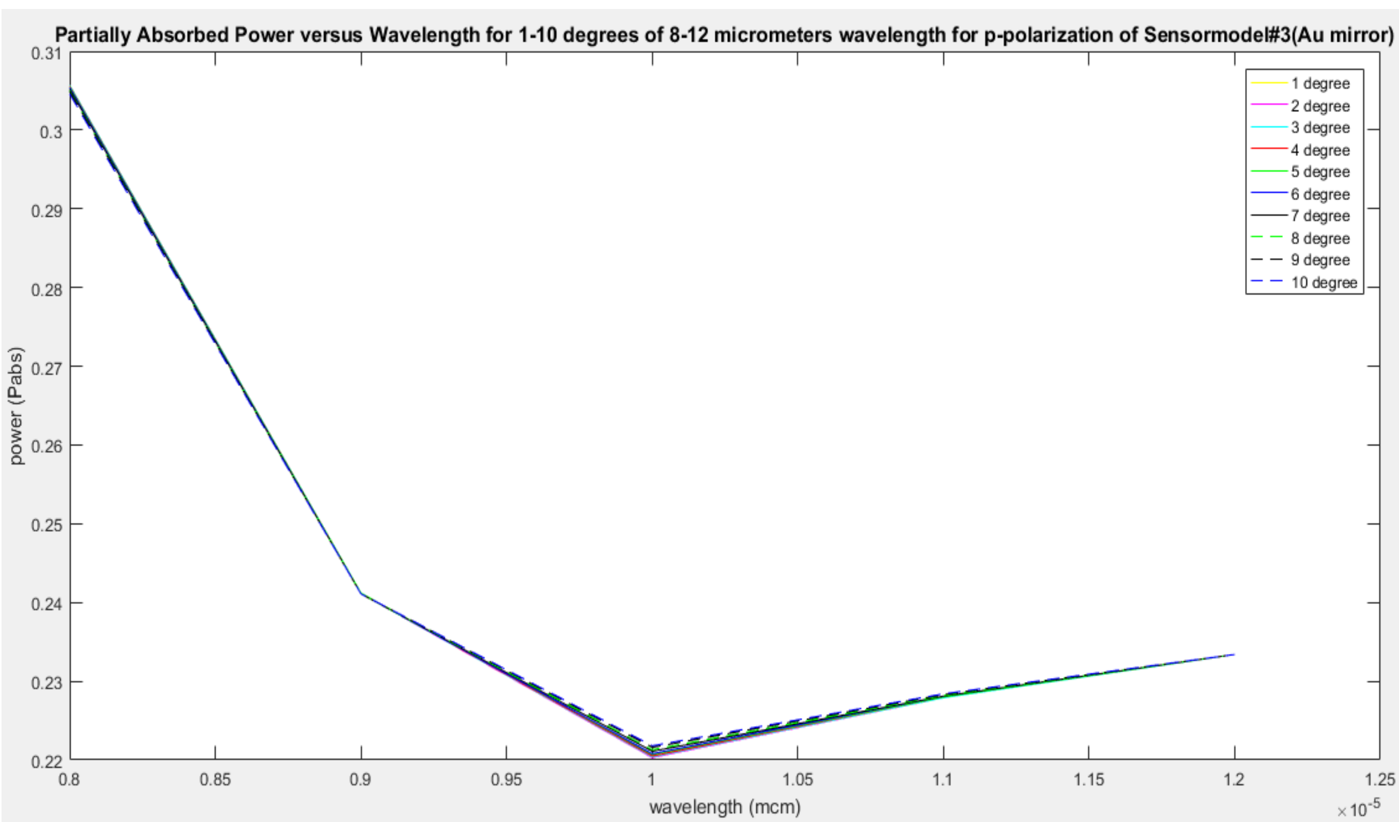


Figure 4-4-28 Partial Absorbed Power versus 8-12 μm wavelength for 1-10 degrees of p-polarization

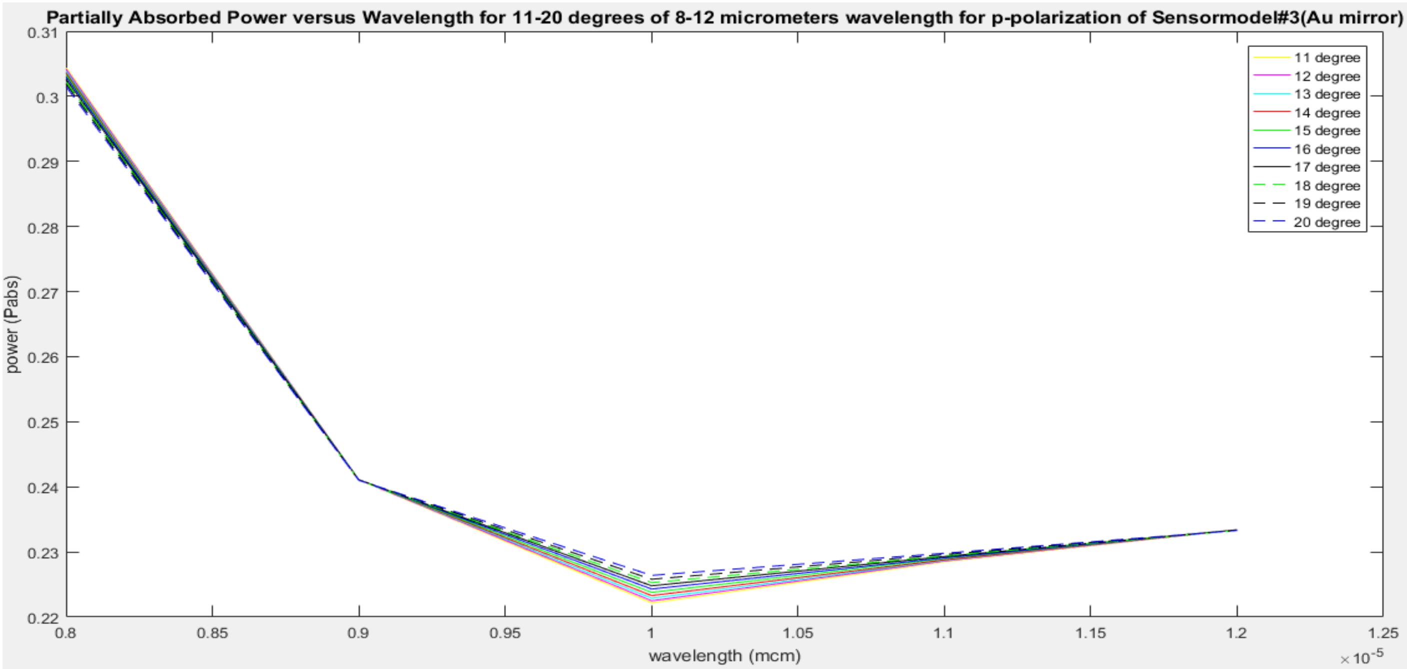


Figure 4-4-29 Partial Absorbed Power versus 8-12 µm wavelength for 11-20 degrees of p-polarization

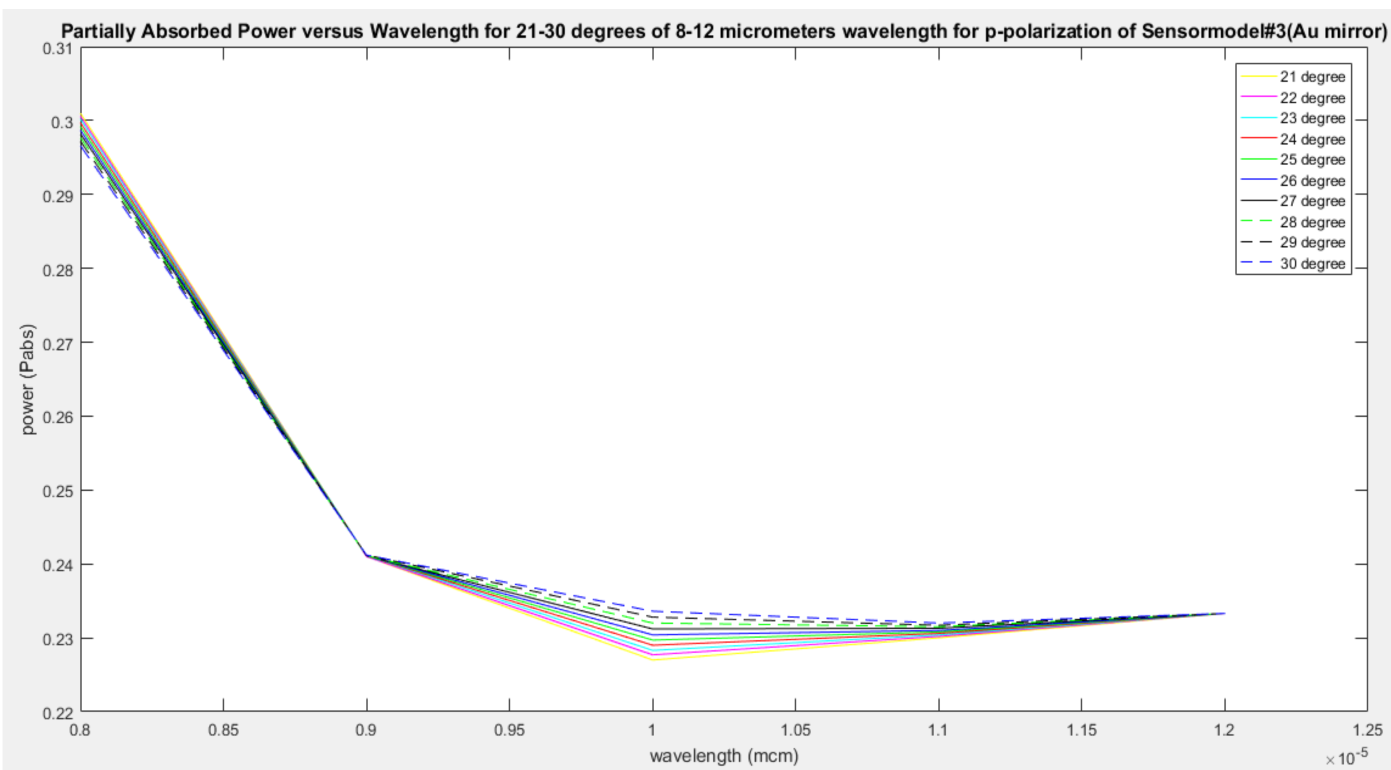


Figure 4-4-30 Partial Absorbed Power versus 8-12 µm wavelength for 21-30 degrees of p-polarization

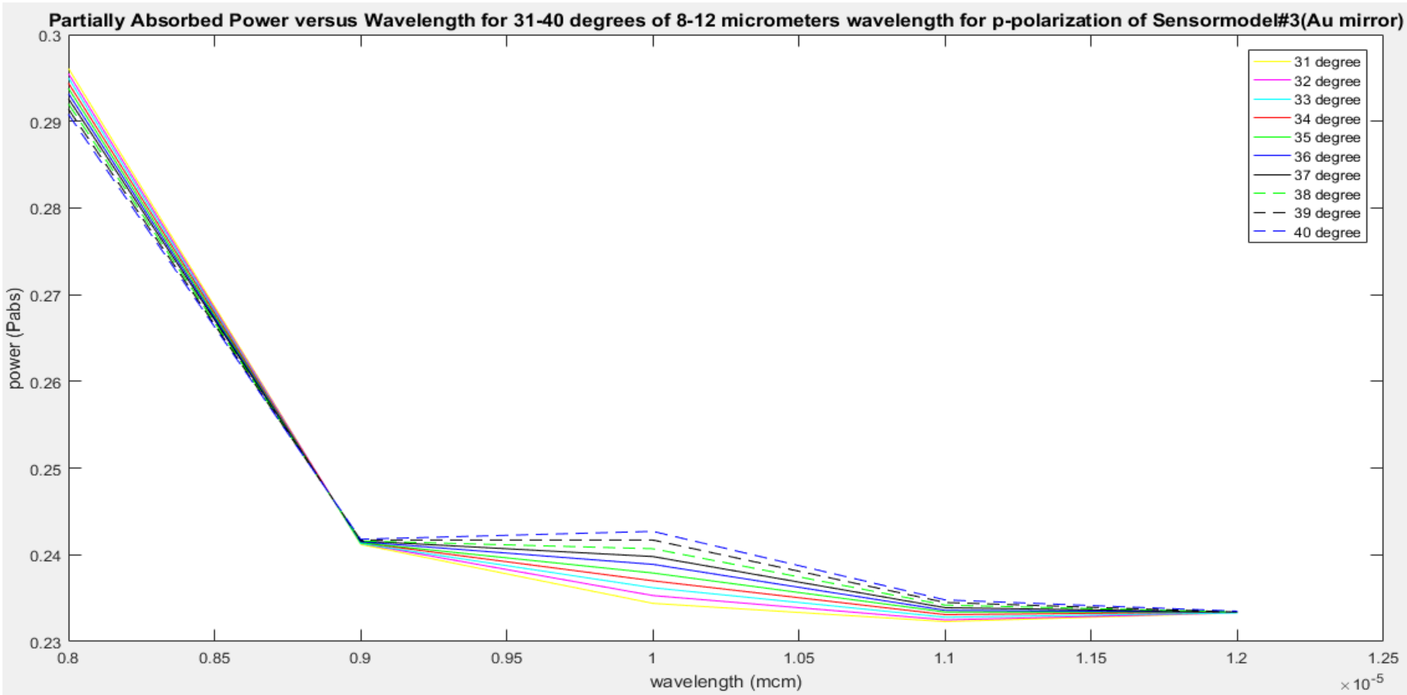


Figure 4-4-31 Partial Absorbed Power versus 8-12 μm wavelength for 31-40 degrees of p-polarization

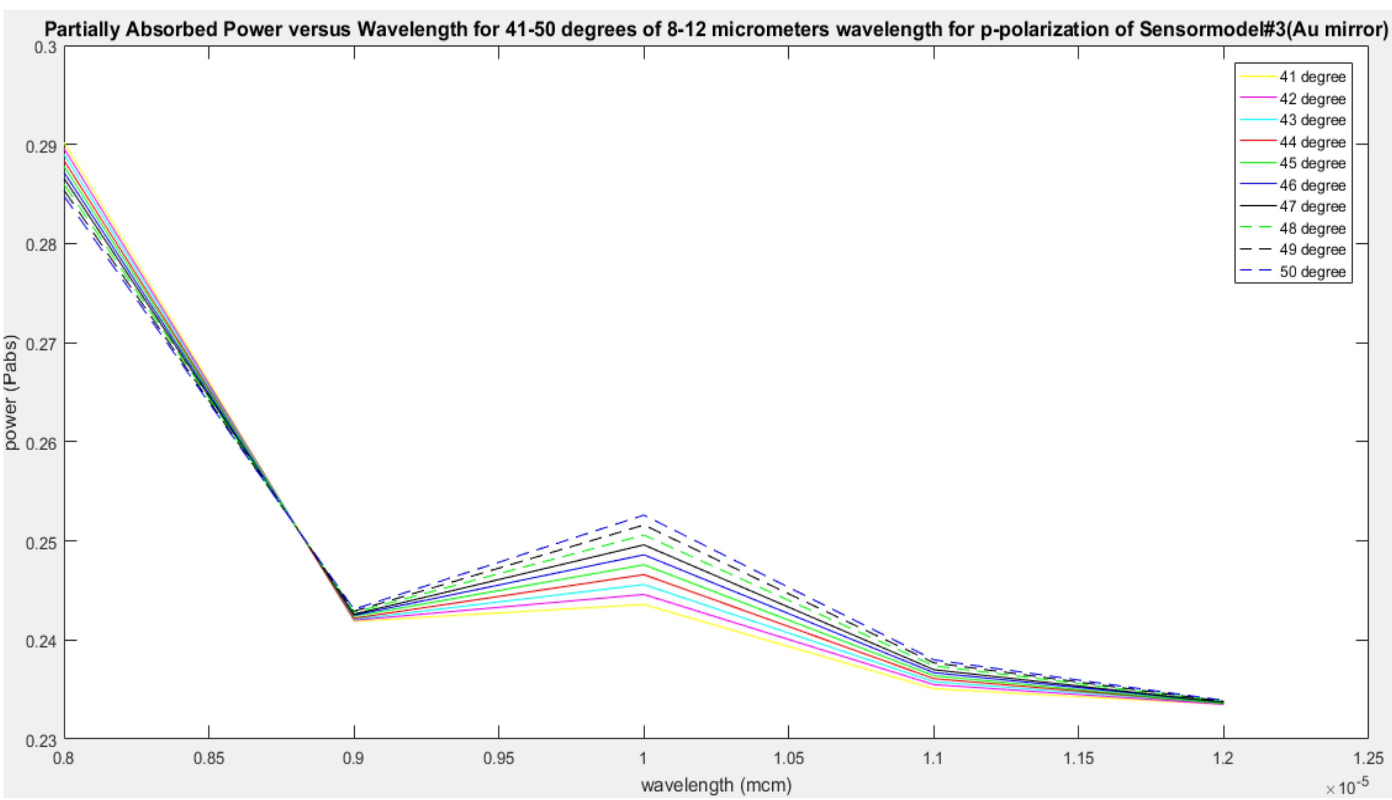


Figure 4-4-32 Partial Absorbed Power versus 8-12 μm wavelength for 41-50 degrees of p-polarization

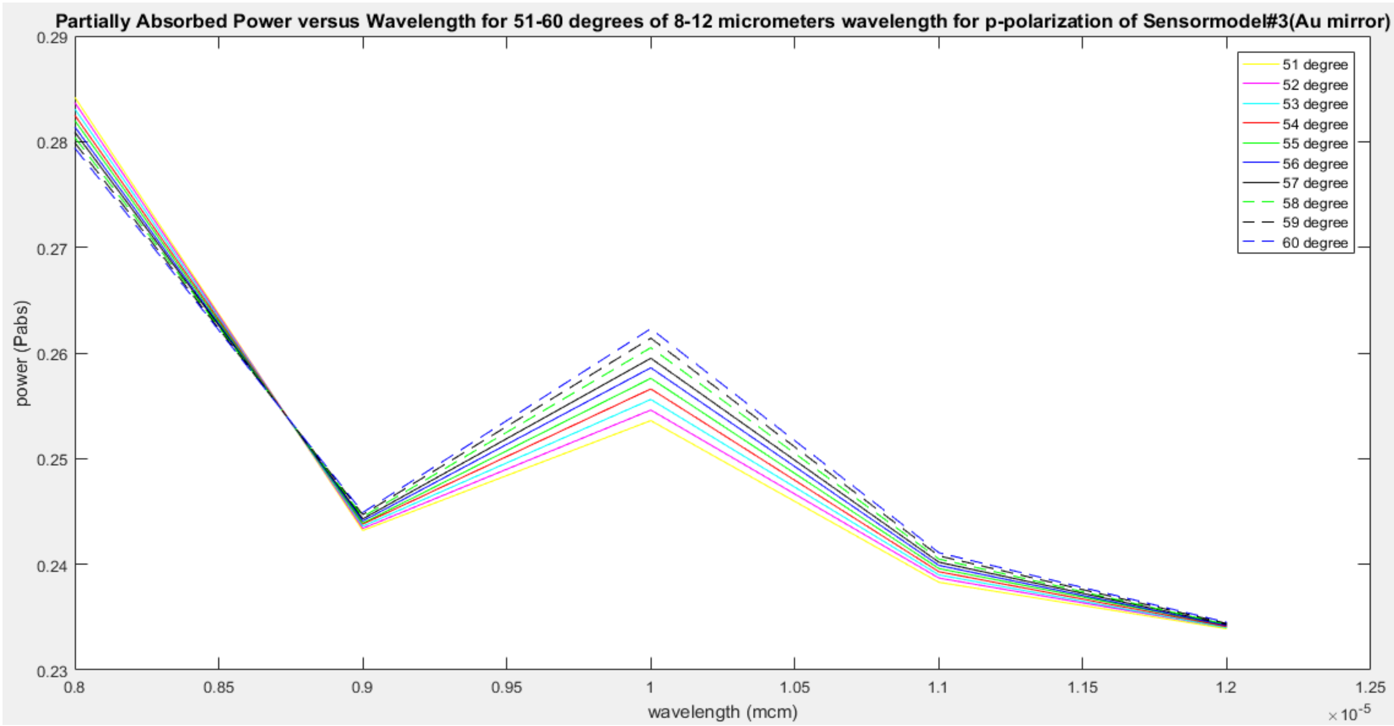


Figure 4-4-33 Partial Absorbed Power versus 8-12 µm wavelength for 51-60 degrees of p-polarization

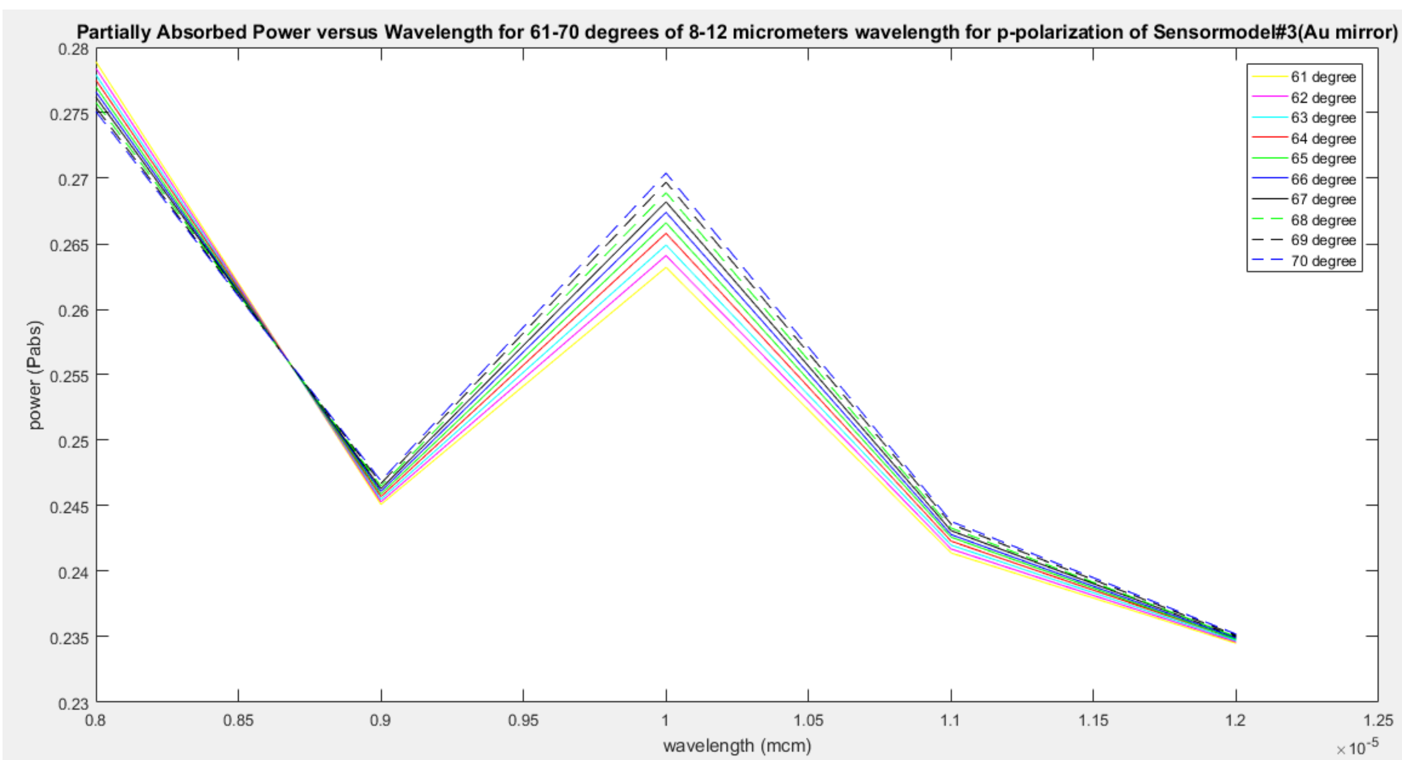


Figure 4-4-34 Partial Absorbed Power versus 8-12 µm wavelength for 61-70 degrees of p-polarization

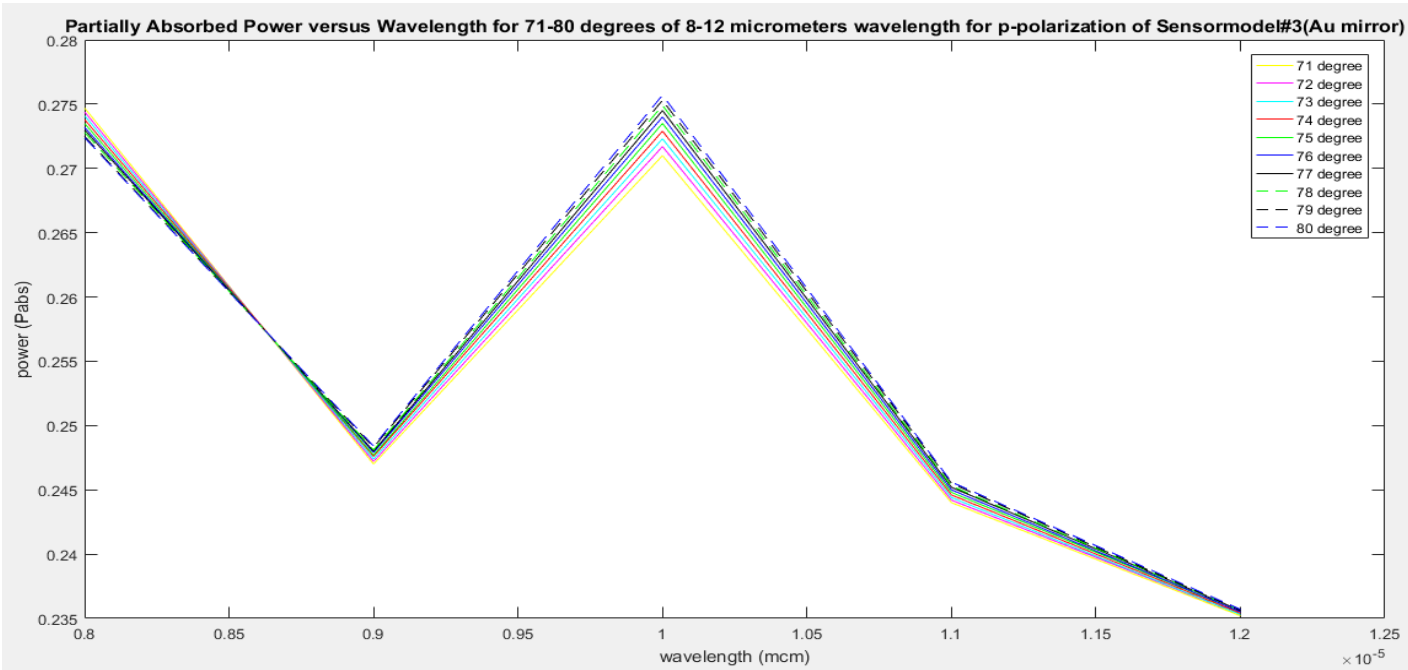


Figure 4-4-35 Partial Absorbed Power versus 8-12 μm wavelength for 71-80 degrees of p-polarization

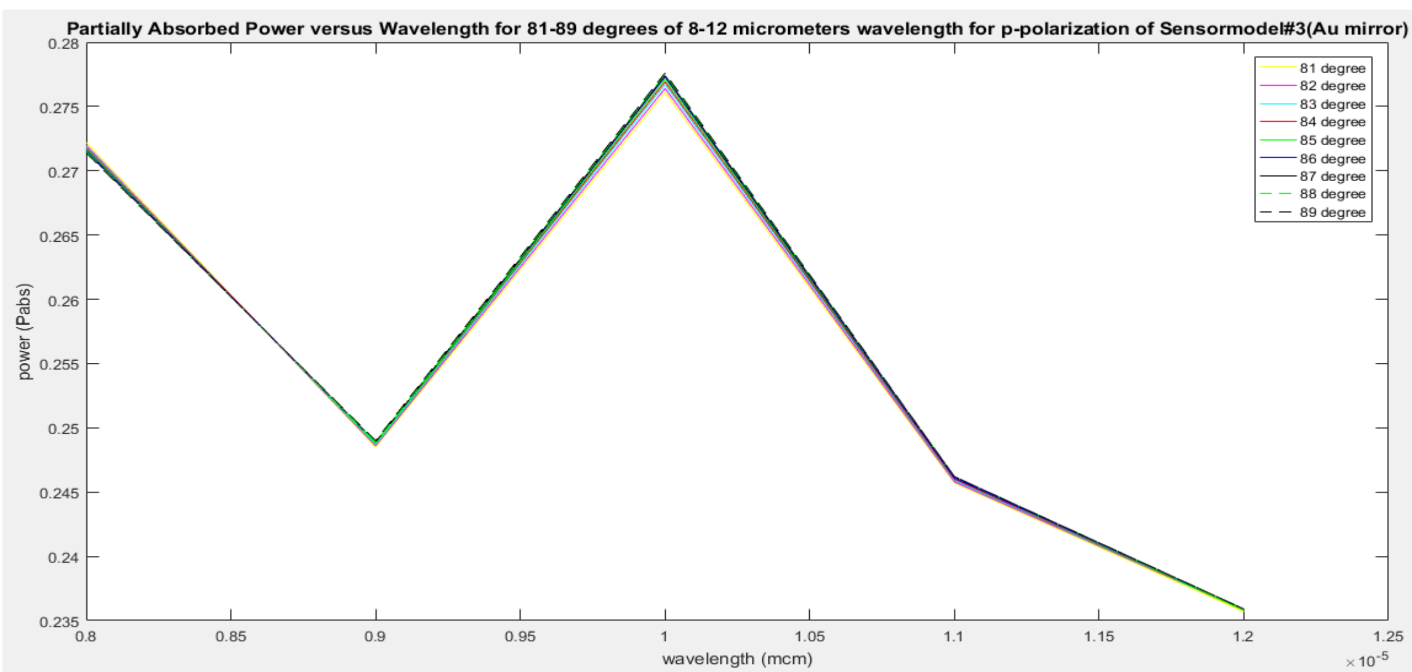


Figure 4-4-36 Partial Absorbed Power versus 8-12 μm wavelength for 81-89 degrees of p-polarization

4.4.1 Discussions

Table 4-4-1 Comparison of maximum and minimum partial reflected power values for s-polarization across wavelengths of 8-12 µm

Wavelength (in µm)	s-polarization -- Minimum pr values (pr → partially reflected power)	s-polarization – Maximum pr values (pr → partially reflected power)
8	0.6943 → 1^0, 2^0, 3^0	0.7269 → 88^0, 89^0
9	0.7588 → 1^0	0.7782 → 88^0, 89^0
10	0.7797 → 1^0, 2^0	0.7931 → 87^0, 88^0, 89^0
11	0.7721 → 1^0, 2^0, 3^0	0.7832 → 86^0, 87^0, 88^0, 89^0
12	0.7666 → 1^0, 2^0, 3^0, 4^0, 5^0	0.7764 → 86^0, 87^0, 88^0, 89^0

Remarks → pr values increase for increase in angle of incidence in s-polarization across wavelengths of 8 – 12 µm

Table 4-4-2 Comparison of maximum and minimum partial absorbed power values for s-polarization across wavelengths of 8-12 µm

Wavelength (in µm)	s-polarization -- Minimum pabs values pabs → partially absorbed power	s-polarization – Maximum pabs values pabs → partially absorbed power
8	0.2731 - 0.0000i → 88^0, 89^0	0.3057 - 0.0000i → 1^0, 2^0, 3^0
9	0.2218 - 0.0000i → 88^0, 89^0	0.2412 - 0.0000i → 1^0
10	0.2069 - 0.0000i → 87^0, 88^0, 89^0	0.2203 - 0.0000i → 1^0, 2^0
11	0.2168 - 0.0000i → 86^0, 87^0, 88^0, 89^0	0.2279 - 0.0000i → 1^0, 2^0, 3^0
12	0.2236 - 0.0000i → 86^0, 87^0, 88^0, 89^0	0.2334 - 0.0000i → 1^0, 2^0, 3^0, 4^0, 5^0

Remarks → pabs values decrease for increase in angle of incidence in s-polarization across wavelengths of 8-12 µm

Table 4-4-3 Comparison of maximum and minimum partial reflected power values for p-polarization across wavelengths of 8-12 µm

Wavelength (in µm)	p-polarization -- Minimum pr values (pr → partially reflected power)	p-polarization – Maximum pr values (pr → partially reflected power)
8	0.6943 → 1^0, 2^0, 3^0	0.7286 → 89^0
9	0.7510 → 89^0	0.7590 → 18^0, 19^0, 20^0, 21^0, 22^0
10	0.7224 → 89^0	0.7797 → 1^0, 2^0
11	0.7538 → 87^0, 88^0, 89^0	0.7721 → 1^0, 2^0, 3^0
12	0.7641 → 86^0, 87^0, 88^0, 89^0	0.7667 → 18^0 to 33^0

Table 4-4-4 Comparison of maximum and minimum partial absorbed power values for p-polarization across wavelengths of 8-12 µm

Wavelength (in µm)	p-polarization - Minimum pabsvalues pabs → partially absorbed power	p-polarization – Maximum pabs values pabs → partially absorbed power
8	0.2714 - 0.0000i → 89^0	0.3057 - 0.0000i → 1^0, 2^0
9	0.2410 - 0.0000i → 18^0, 19^0, 20^0, 21^0, 22^0	0.2490 - 0.0000i → 89^0
10	0.2203 - 0.0000i → 1^0, 2^0	0.2776 - 0.0000i → 89^0
11	0.2279 - 0.0000i → 1^0, 2^0, 3^0	0.2462 - 0.0000i → 87^0, 88^0, 89^0
12	0.2334 - 0.0000i → 18^0 to 33^0	0.2359 - 0.0000i → 86^0, 87^0, 88^0, 89^0

Remarks: In almost all the cases we see that the min pr value at an angle results for max pabs value at the same angle for a certain wavelength and vice-versa, however in some cases this is not the norm, because there is a very small amount of transmission power involved.

4.5 Results for Sensor Structure 4

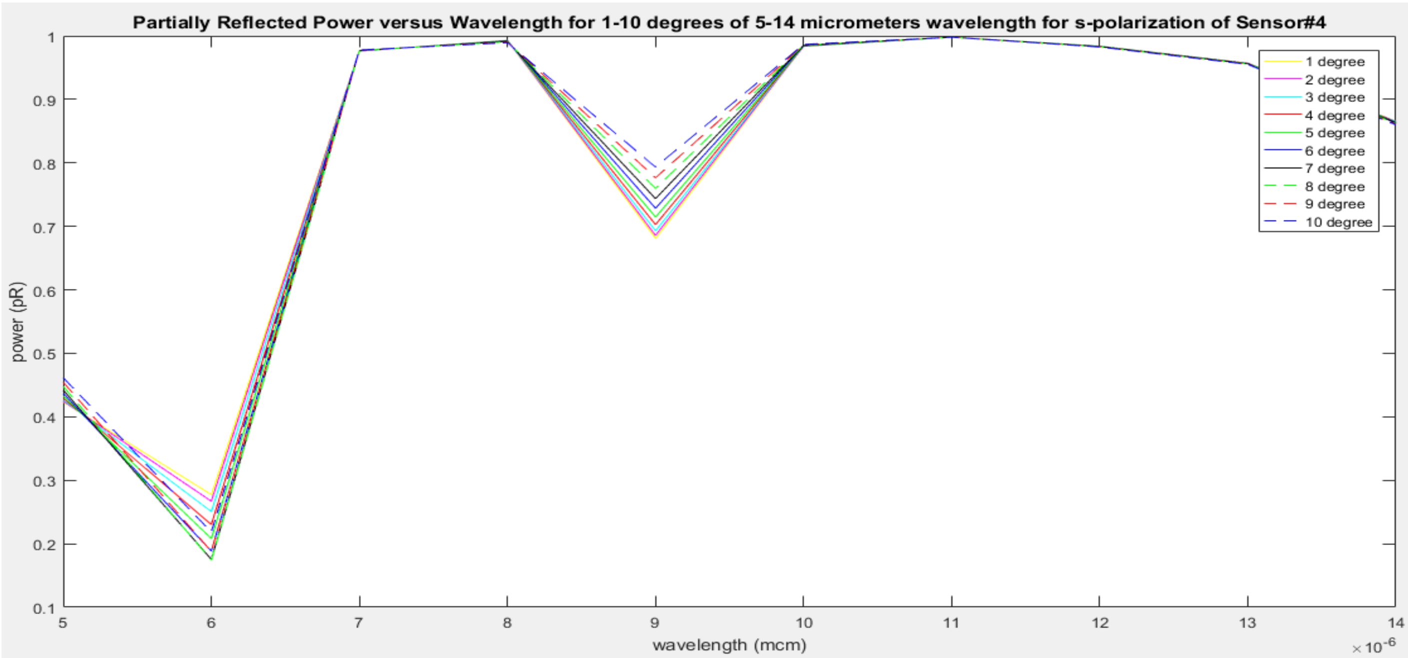


Figure 4-5-1 Partial Reflected Power versus 5-14 μm wavelength for 1-10 degrees of s-polarization

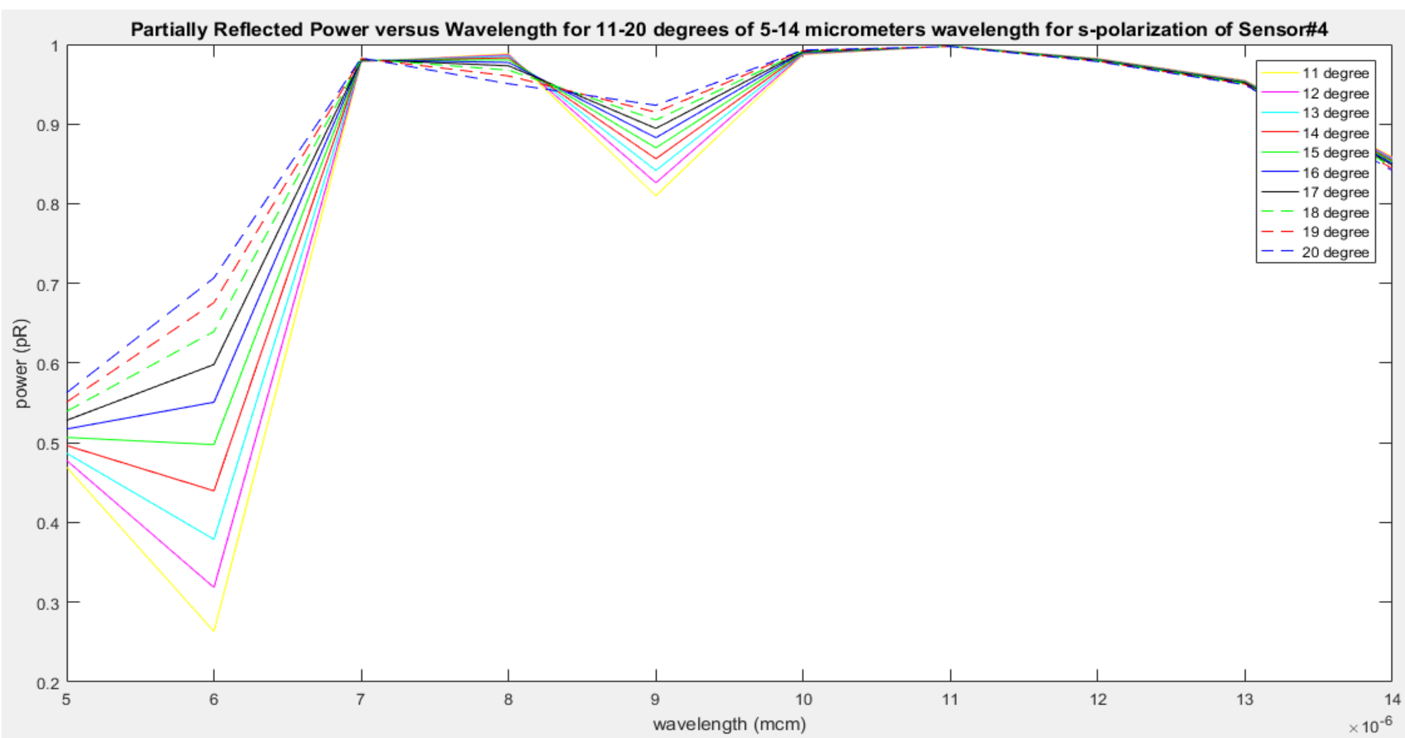


Figure 4-5-2 Partial Reflected Power versus 5-14 μm wavelength for 11-20 degrees of s-polarization

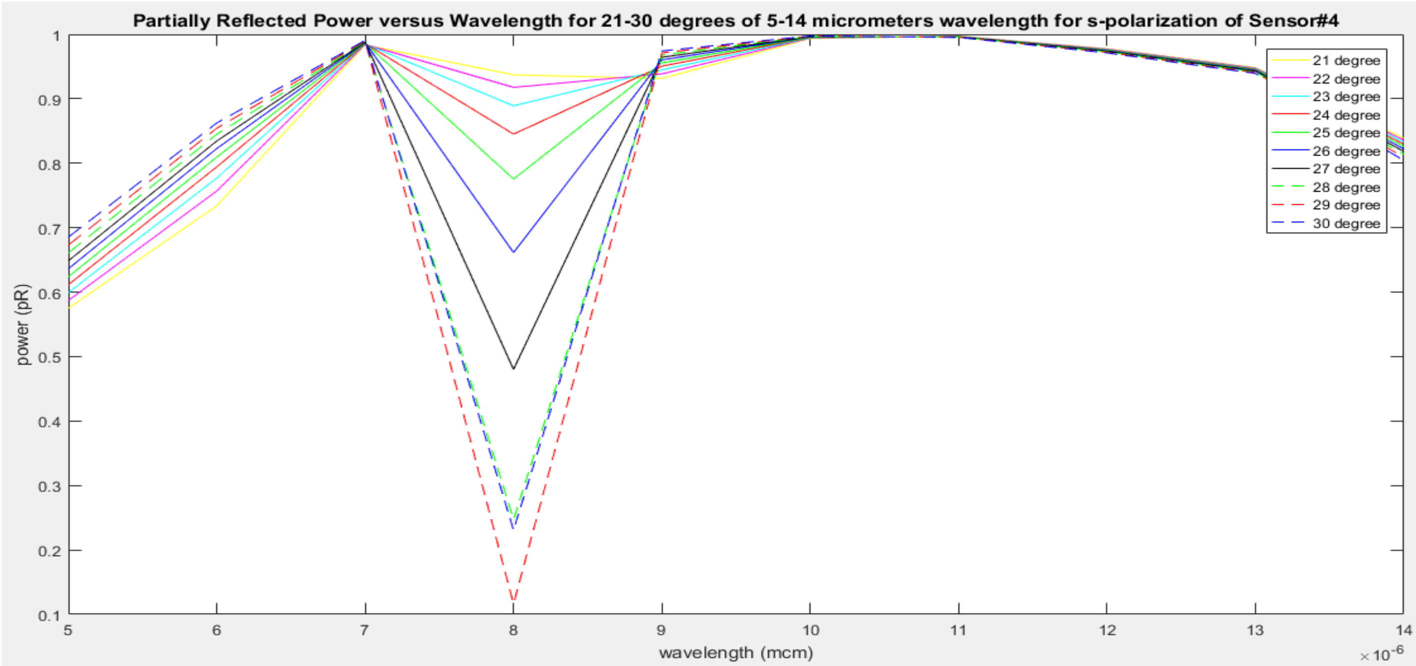


Figure 4-5-3 Partial Reflected Power versus 5-14 µm wavelength for 21-30 degrees of s-polarization

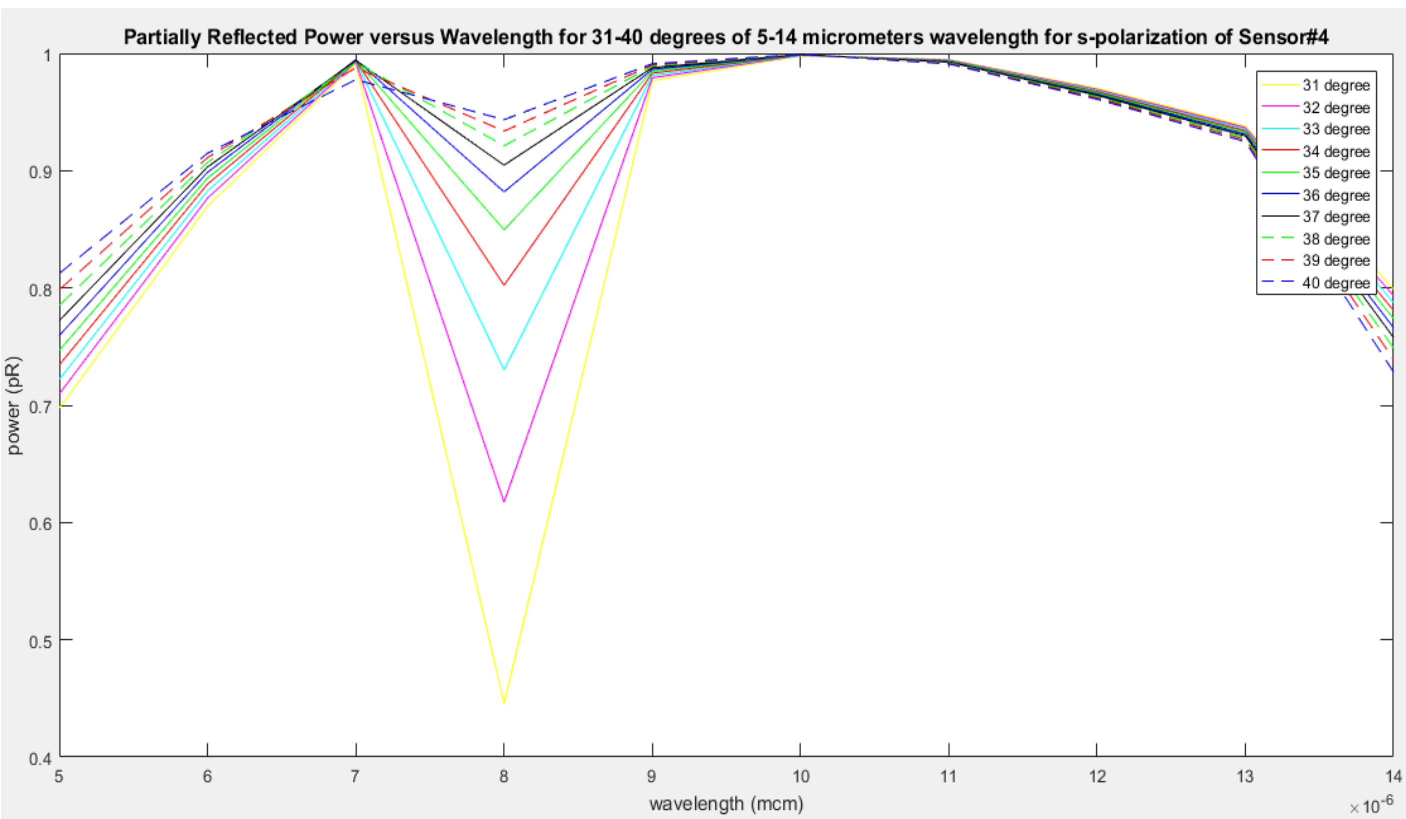


Figure 4-5-4 Partial Reflected Power versus 5-14 µm wavelength for 31-40 degrees of s-polarization

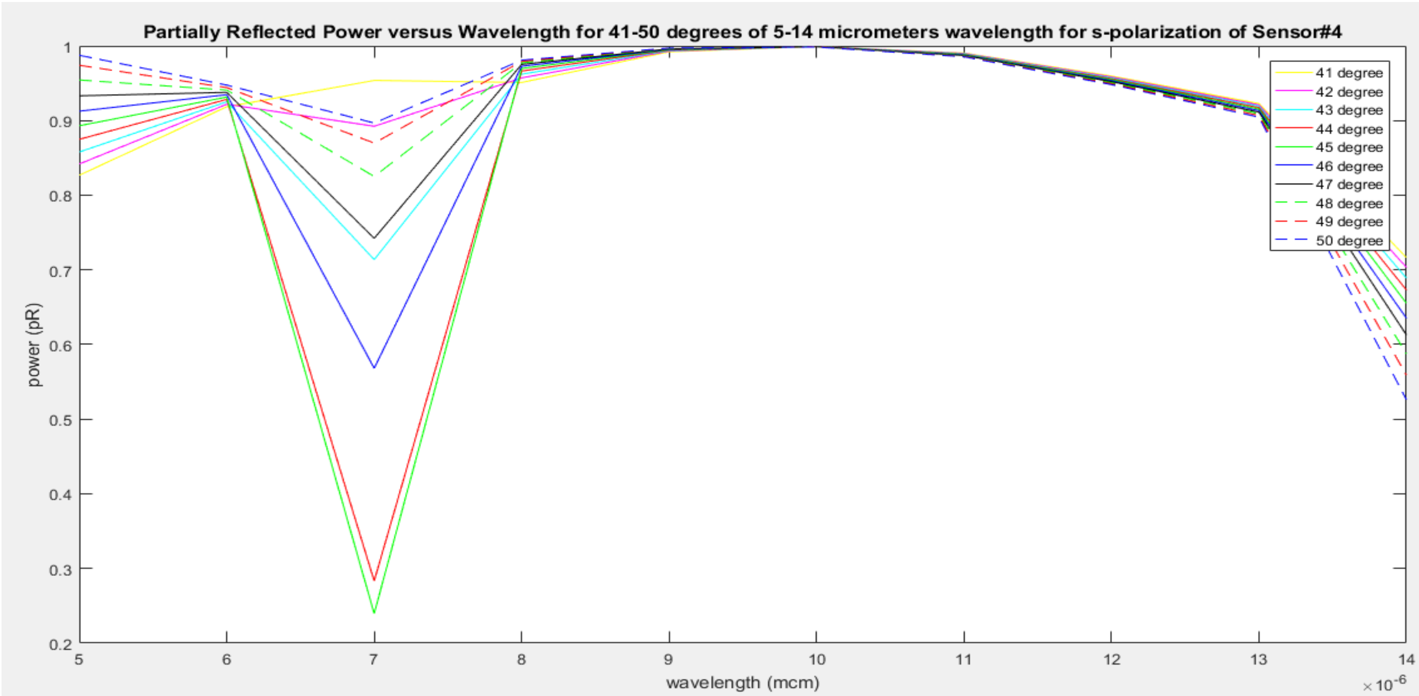


Figure 4-5-5 Partial Reflected Power versus 5-14 µm wavelength for 41-50 degrees of s-polarization

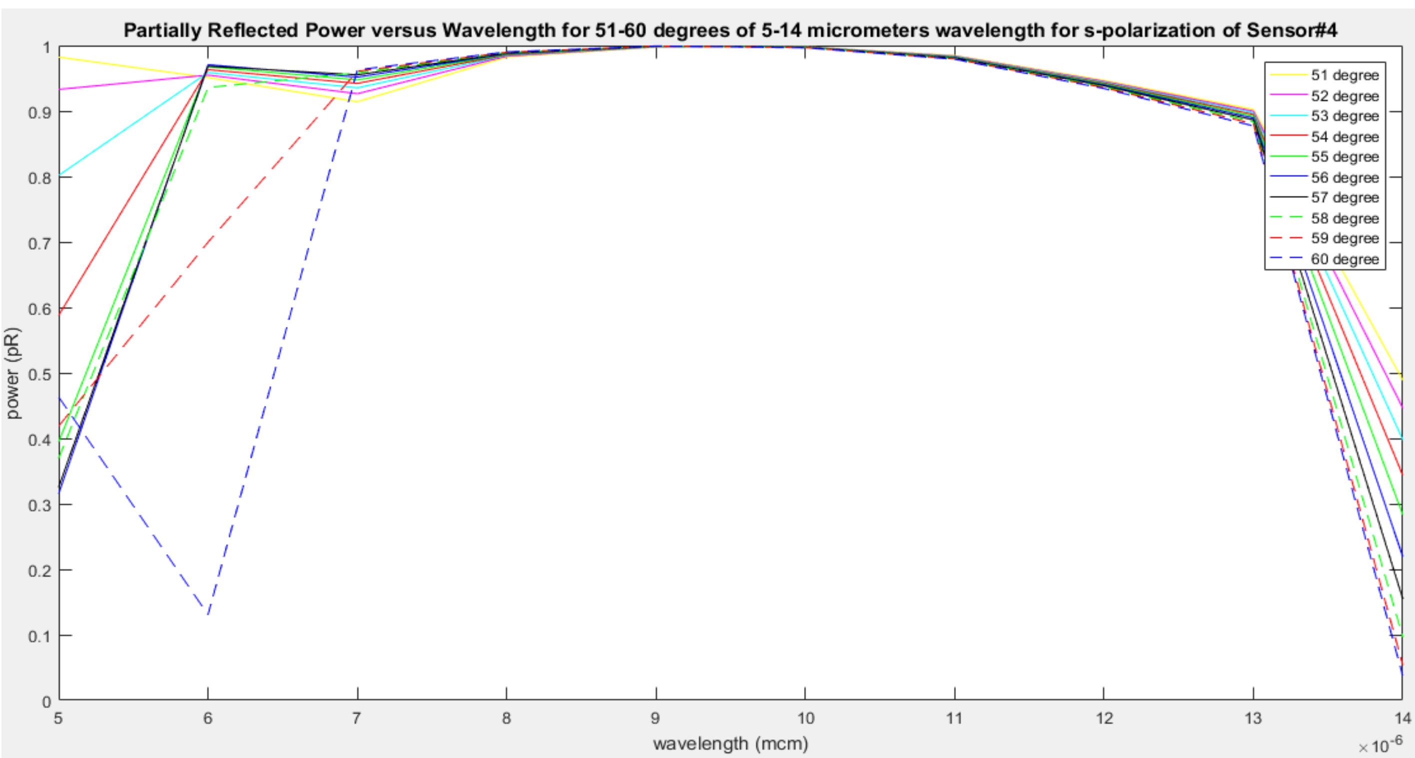


Figure 4-5-6 Partial Reflected Power versus 5-14 µm wavelength for 51-60 degrees of s-polarization

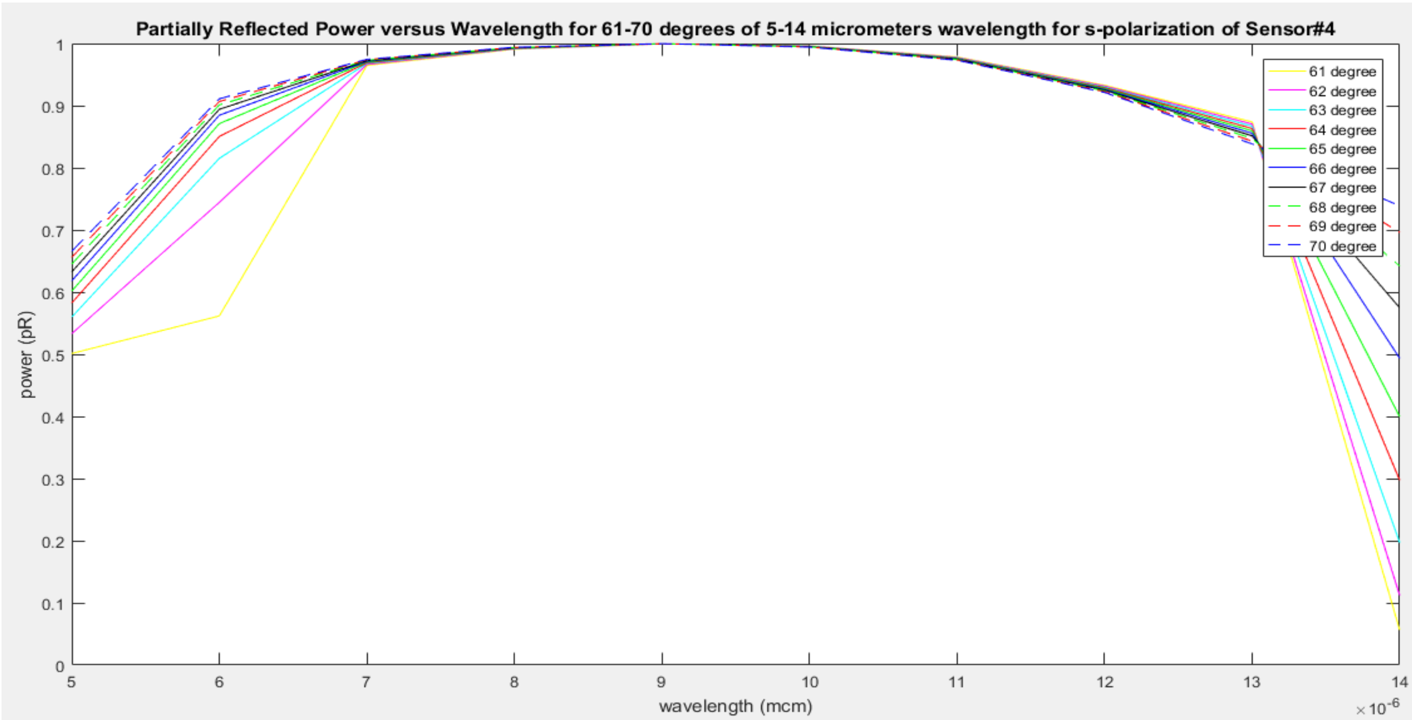


Figure 4-5-7 Partial Reflected Power versus 5-14 µm wavelength for 61-70 degrees of s-polarization

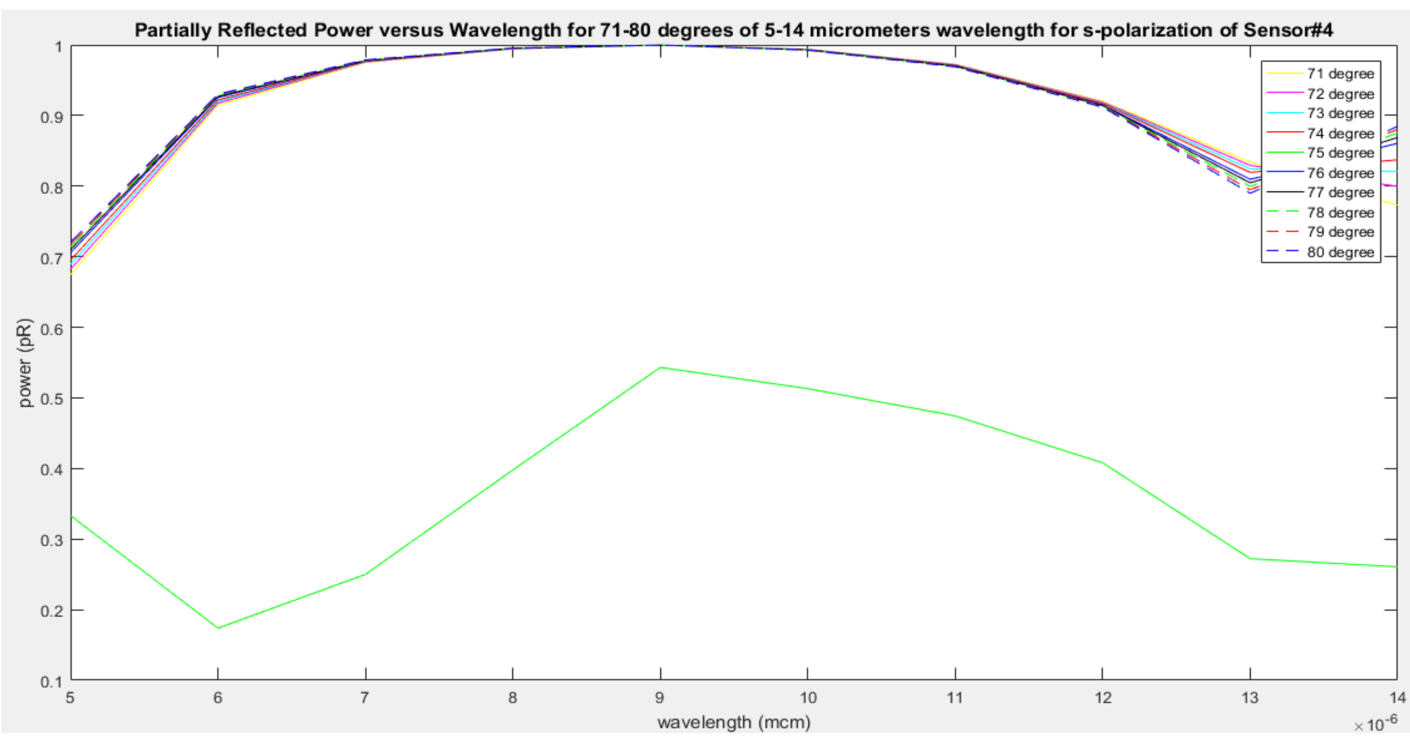


Figure 4-5-8 Partial Reflected Power versus 5-14 µm wavelength for 71-80 degrees of s-polarization

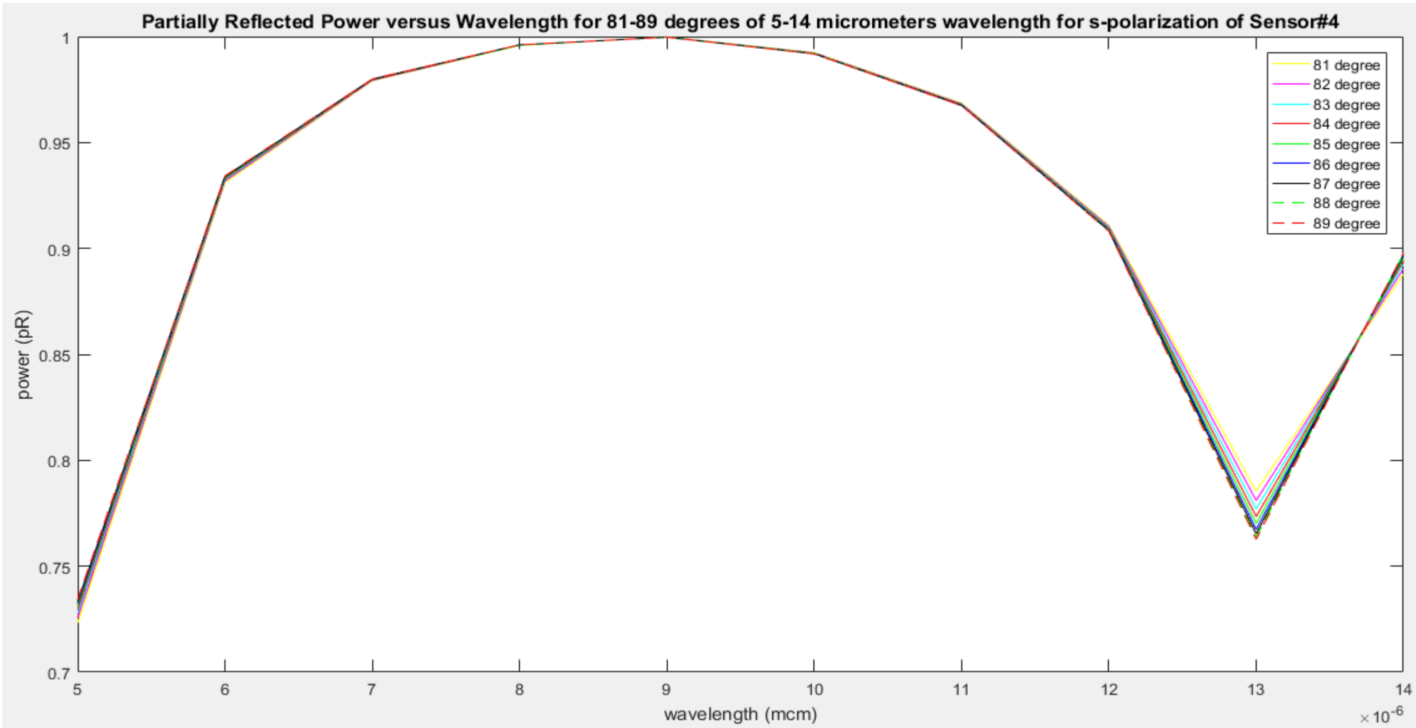


Figure 4-5-9 Partial Reflected Power versus 5-14 µm wavelength for 81-89 degrees of s-polarization

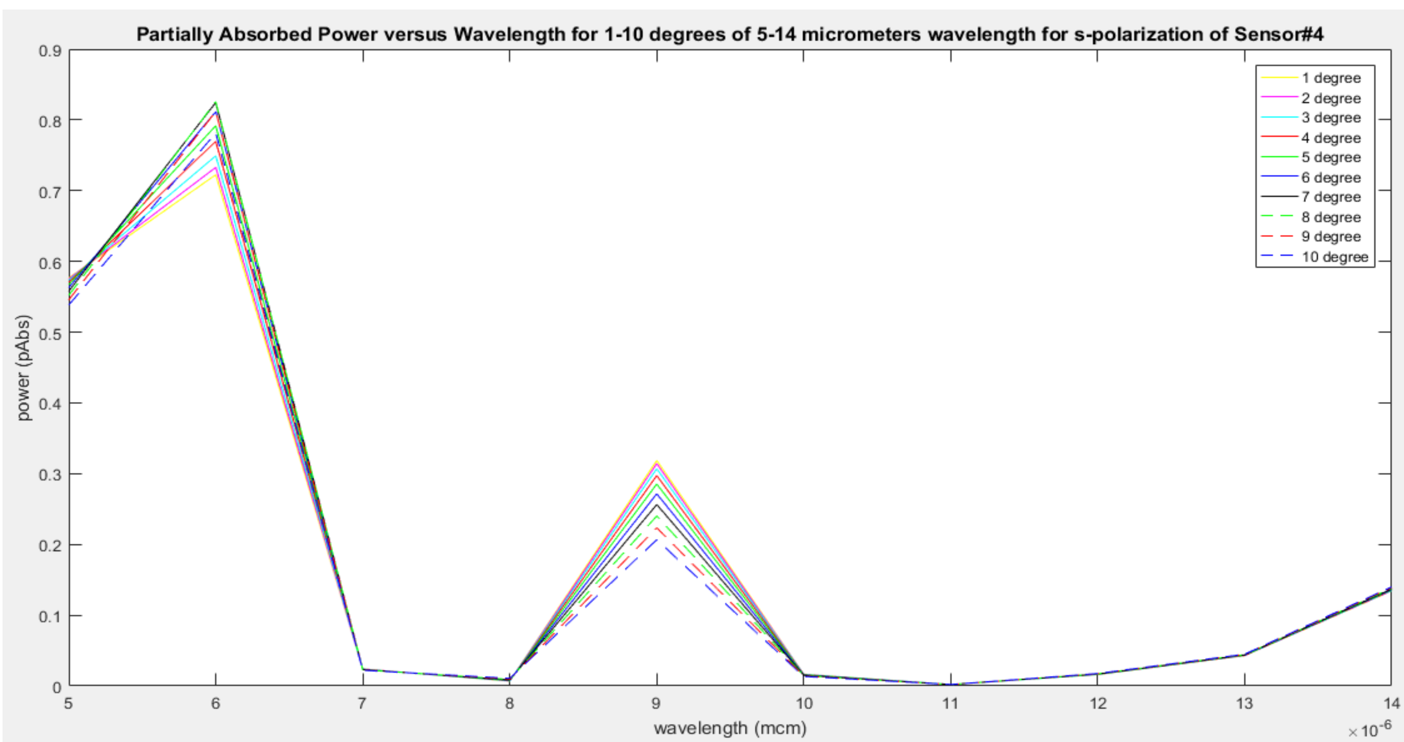


Figure 4-5-10 Partial Absorbed Power versus 5-14 µm wavelength for 1-10 degrees of s-polarization

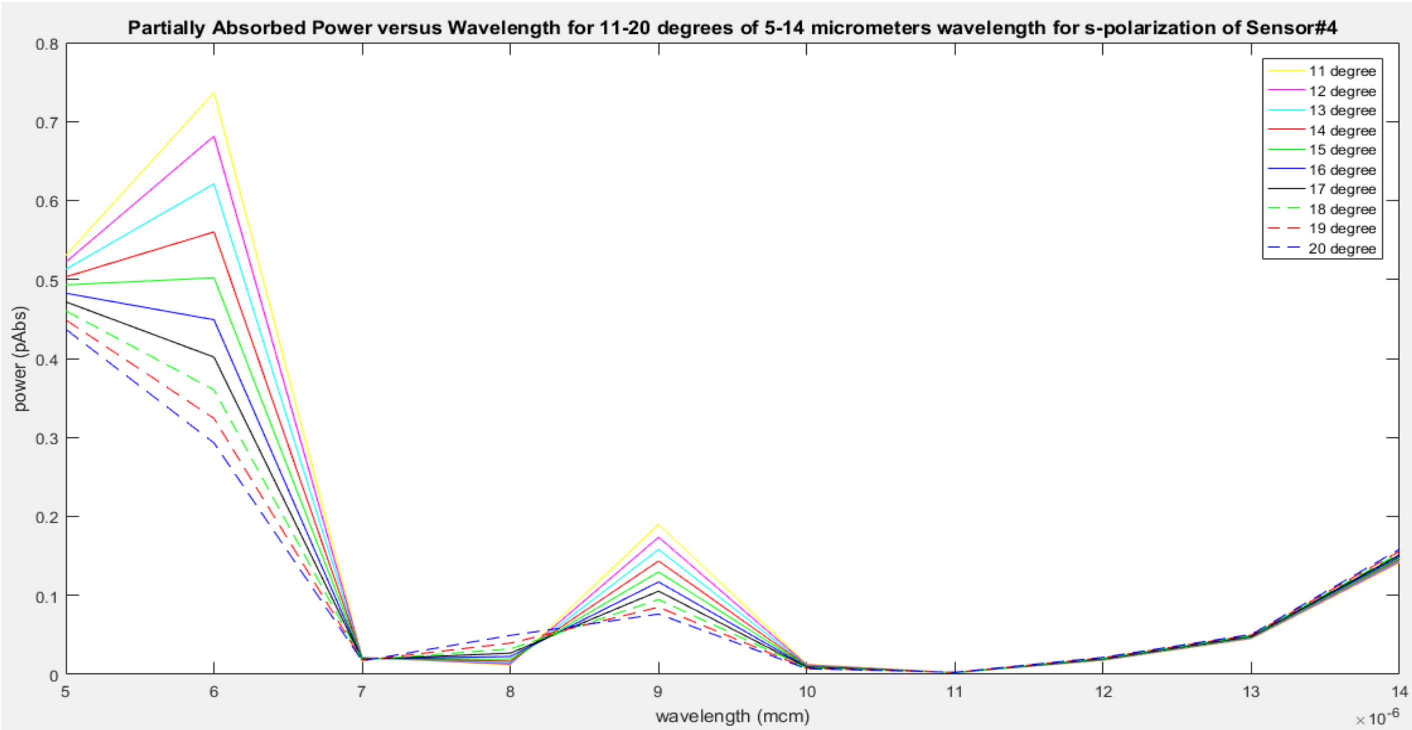


Figure 4-5-11 Partial Absorbed Power versus 5-14 μm wavelength for 11-20 degrees of s-polarization

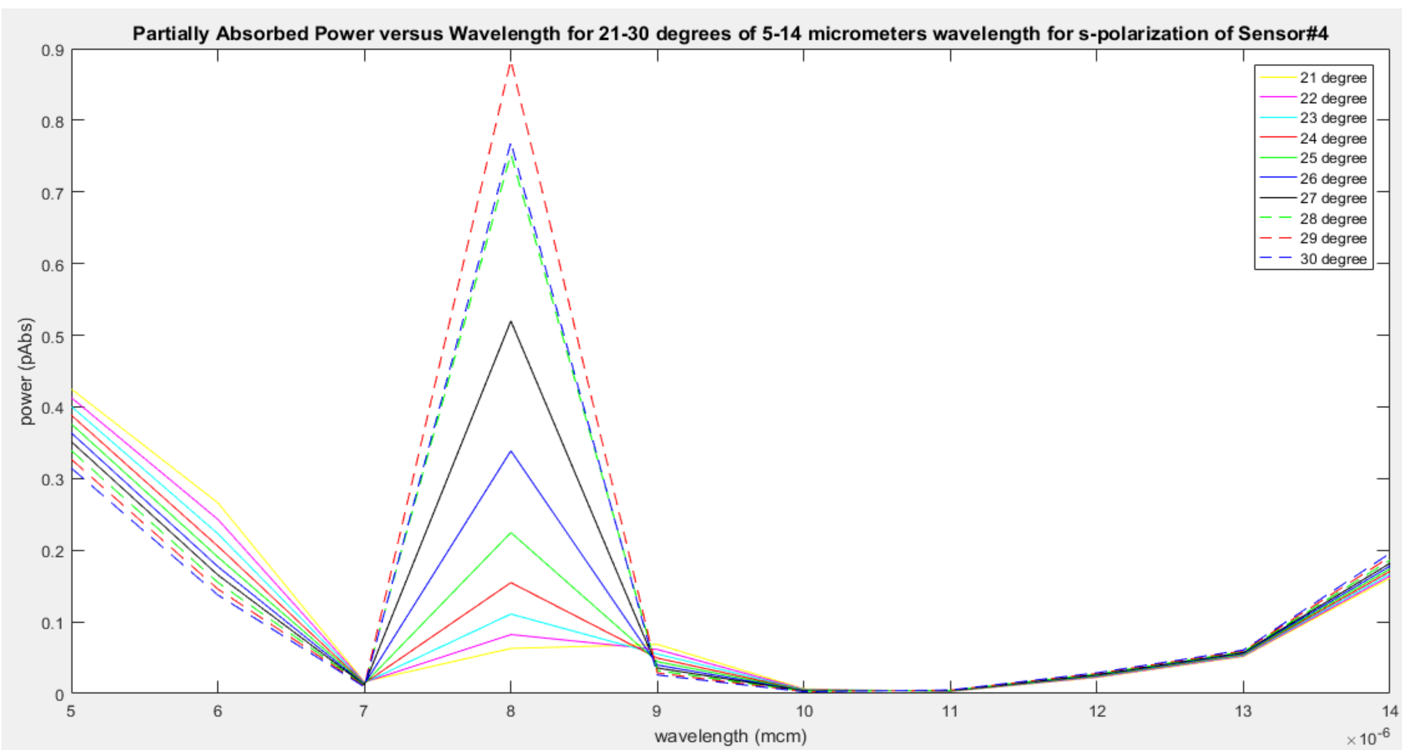


Figure 4-5-12 Partial Absorbed Power versus 5-14 μm wavelength for 21-30 degrees of s-polarization

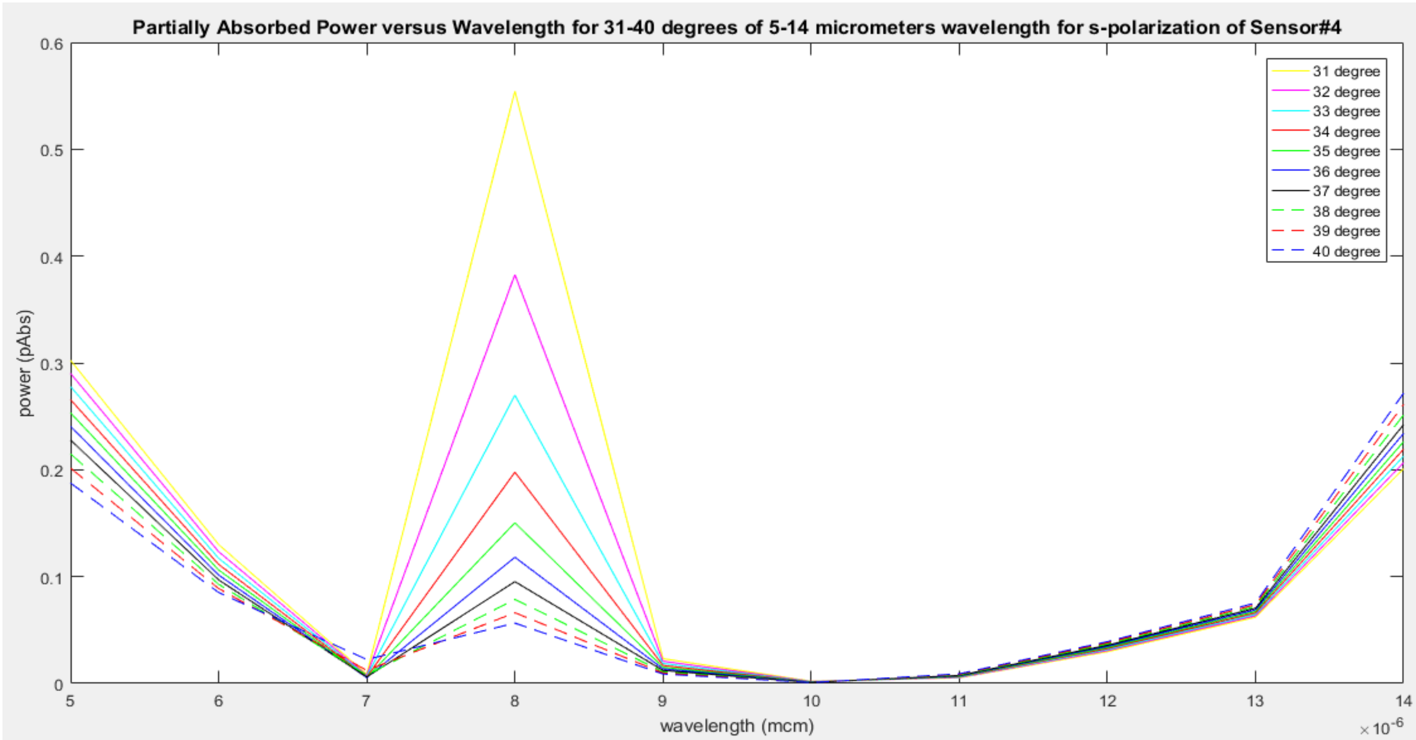


Figure 4-5-13 Partial Absorbed Power versus 5-14 μm wavelength for 31-40 degrees of s-polarization

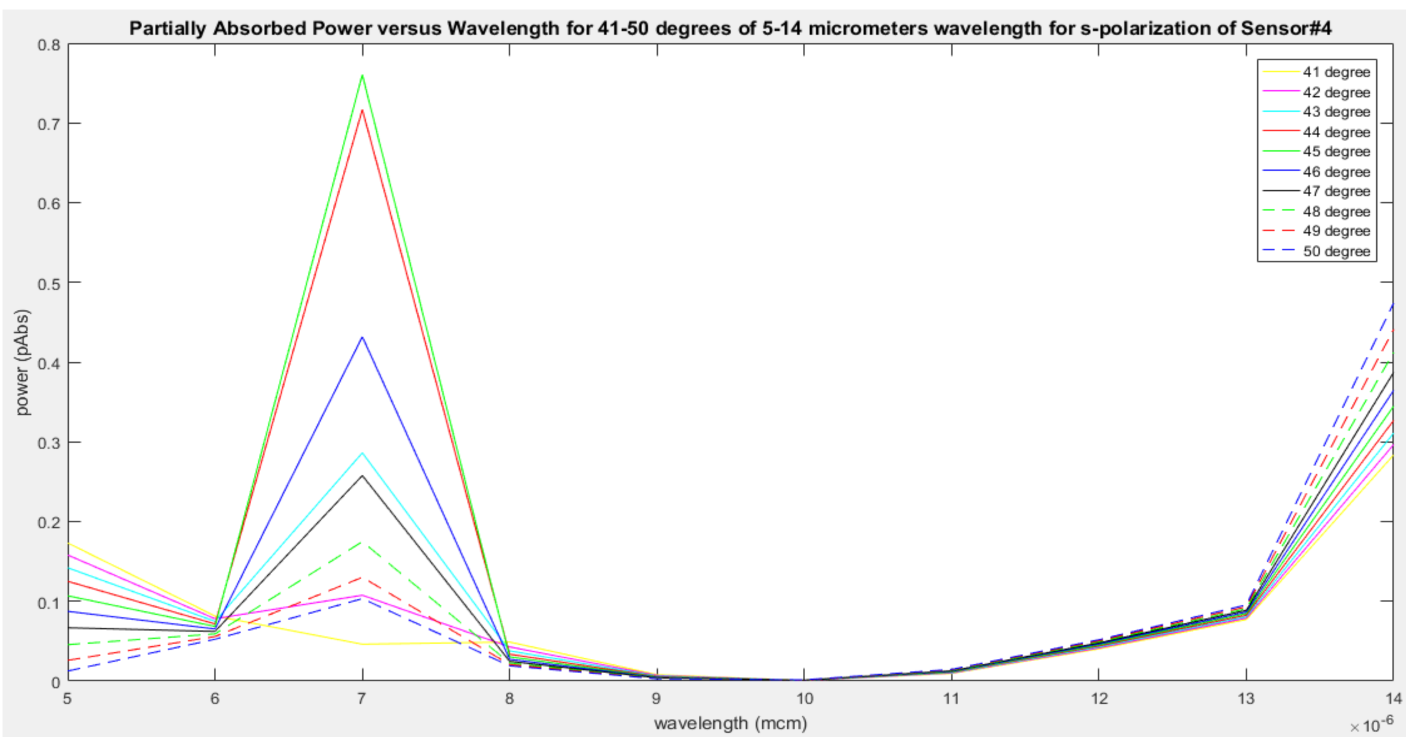


Figure 4-5-14 Partial Absorbed Power versus 5-14 μm wavelength for 41-50 degrees of s-polarization

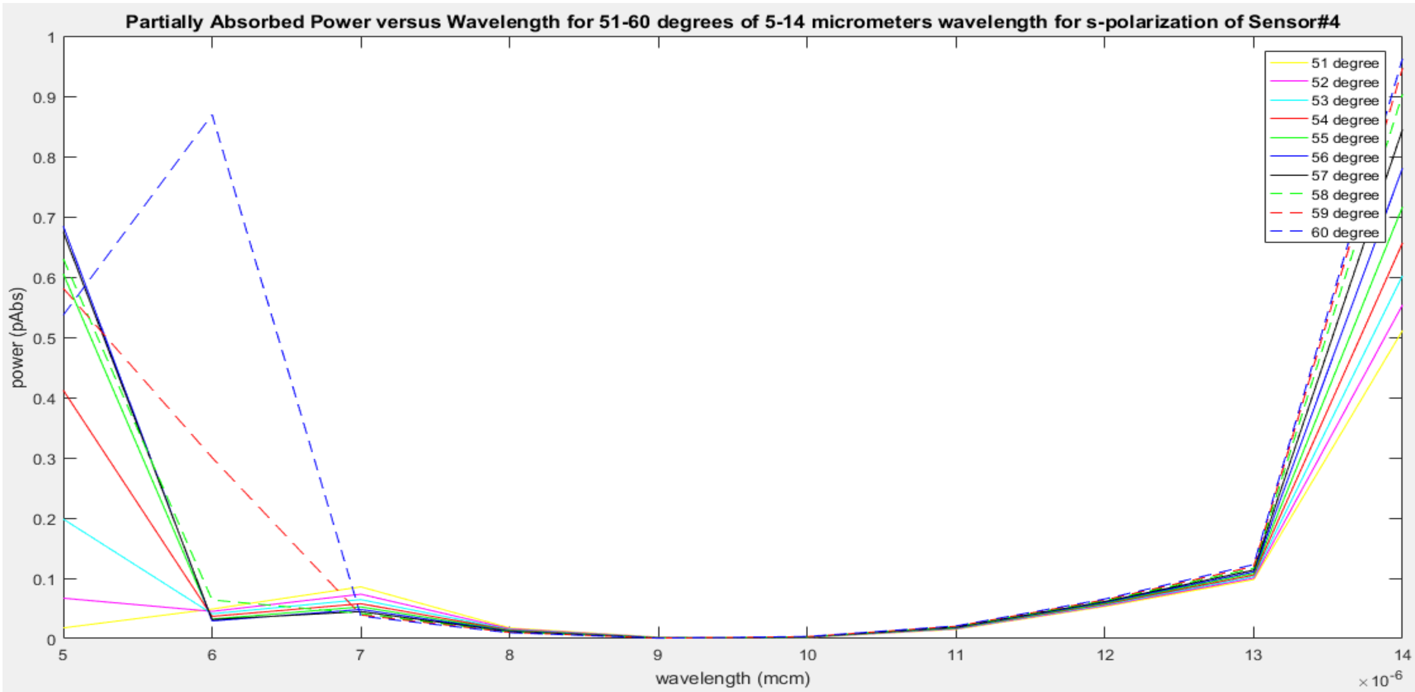


Figure 4-5-15 Partial Absorbed Power versus 5-14 µm wavelength for 51-60 degrees of s-polarization

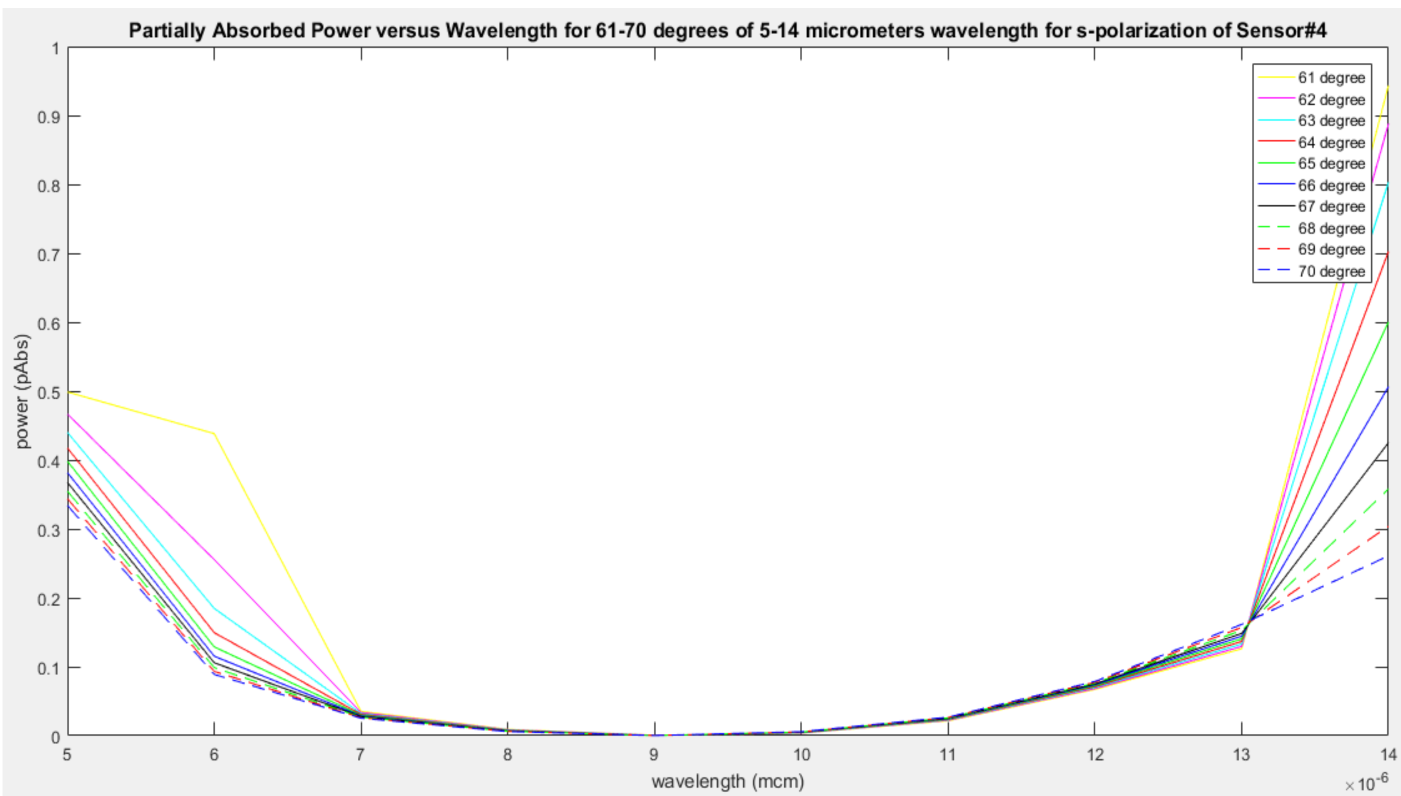


Figure 4-5-16 Partial Absorbed Power versus 5-14 µm wavelength for 61-70 degrees of s-polarization

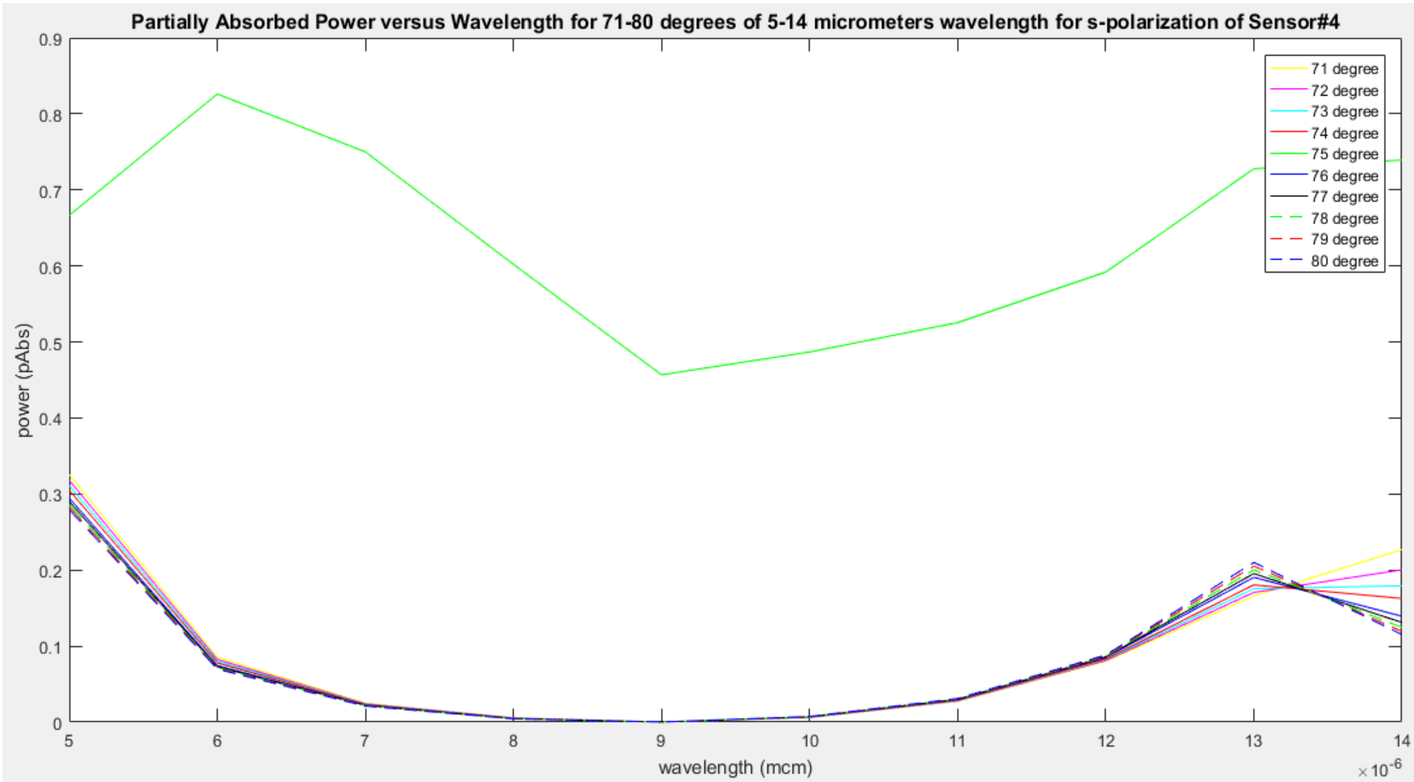


Figure 4-5-17 Partial Absorbed Power versus 5-14 μm wavelength for 71-80 degrees of s-polarization

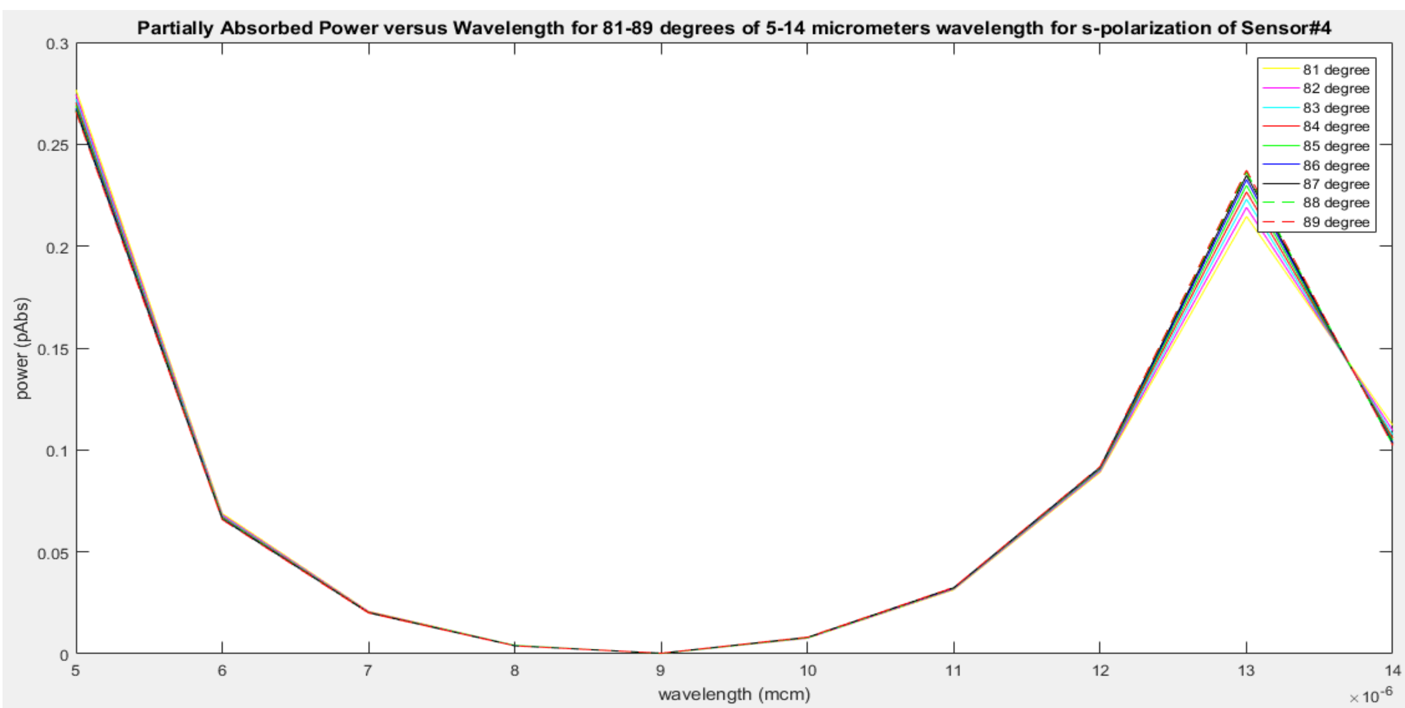


Figure 4-5-18 Partial Absorbed Power versus 5-14 μm wavelength for 81-89 degrees of s-polarization

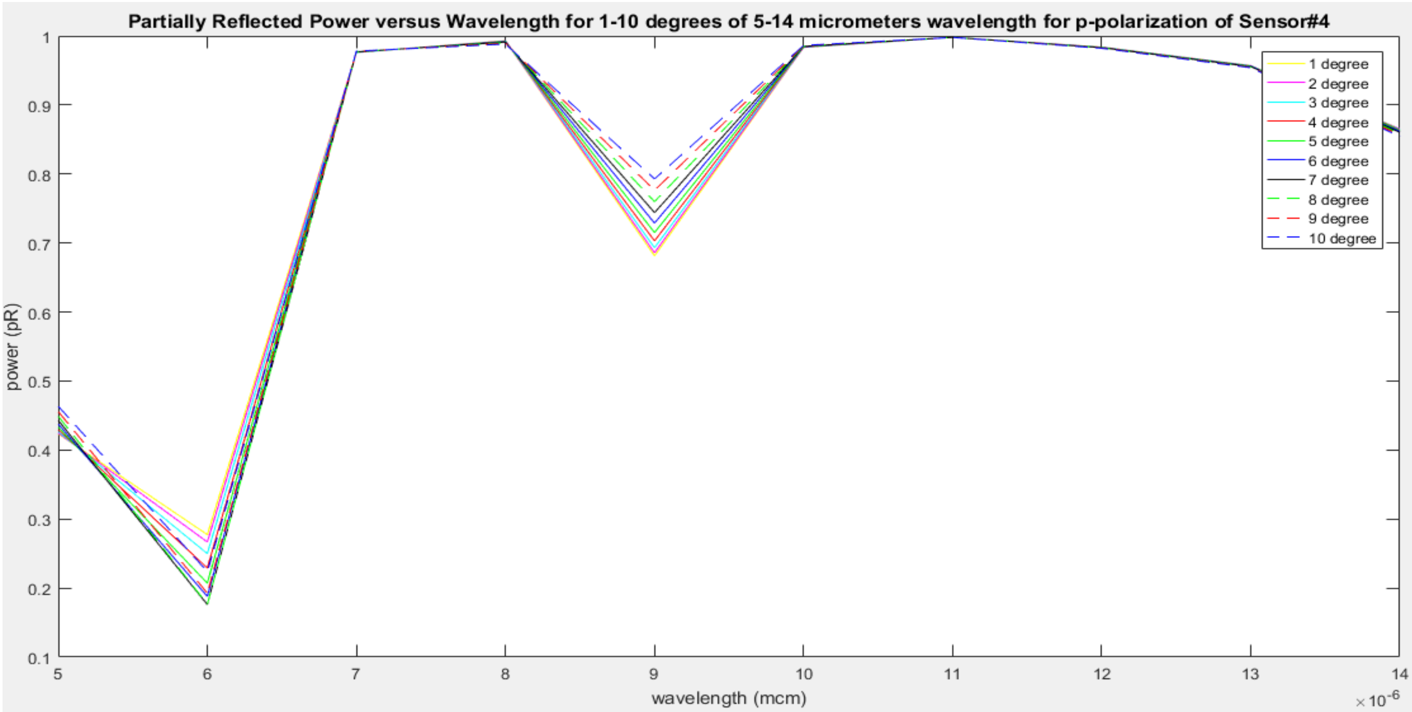


Figure 4-5-19 Partial Reflected Power versus 5-14 μm wavelength for 1-10 degrees of p-polarization

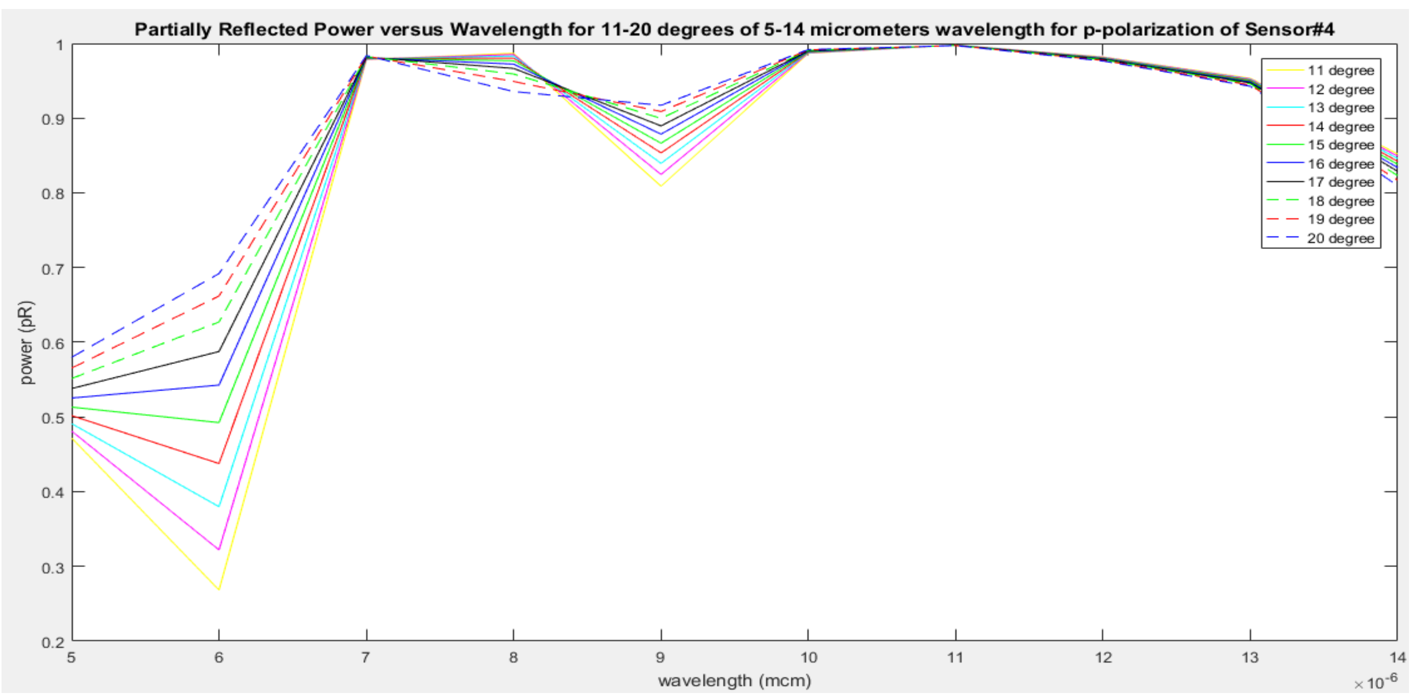


Figure 4-5-20 Partial Reflected Power versus 5-14 μm wavelength for 11-20 degrees of p-polarization

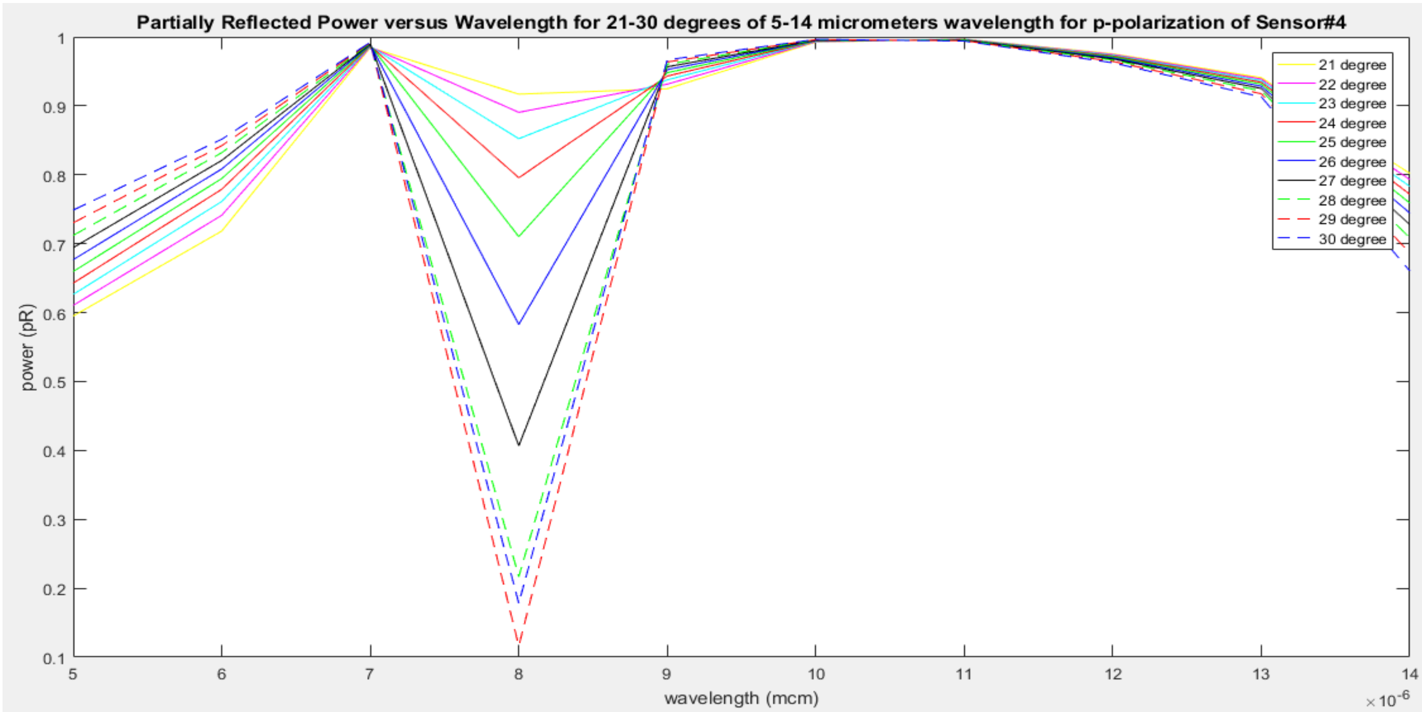


Figure 4-5-21 Partial Reflected Power versus 5-14 µm wavelength for 21-30 degrees of p-polarization

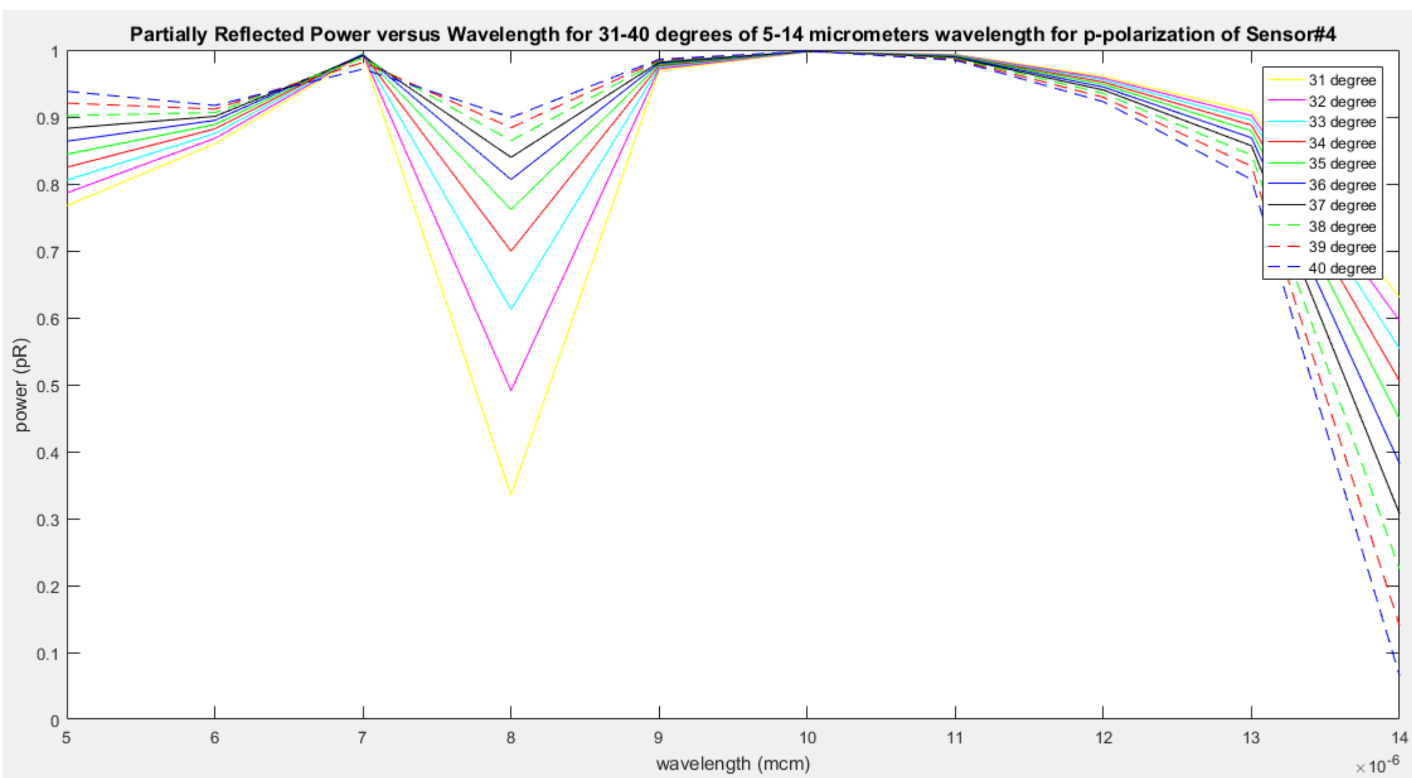


Figure 4-5-22 Partial Reflected Power versus 5-14 µm wavelength for 31-40 degrees of p-polarization

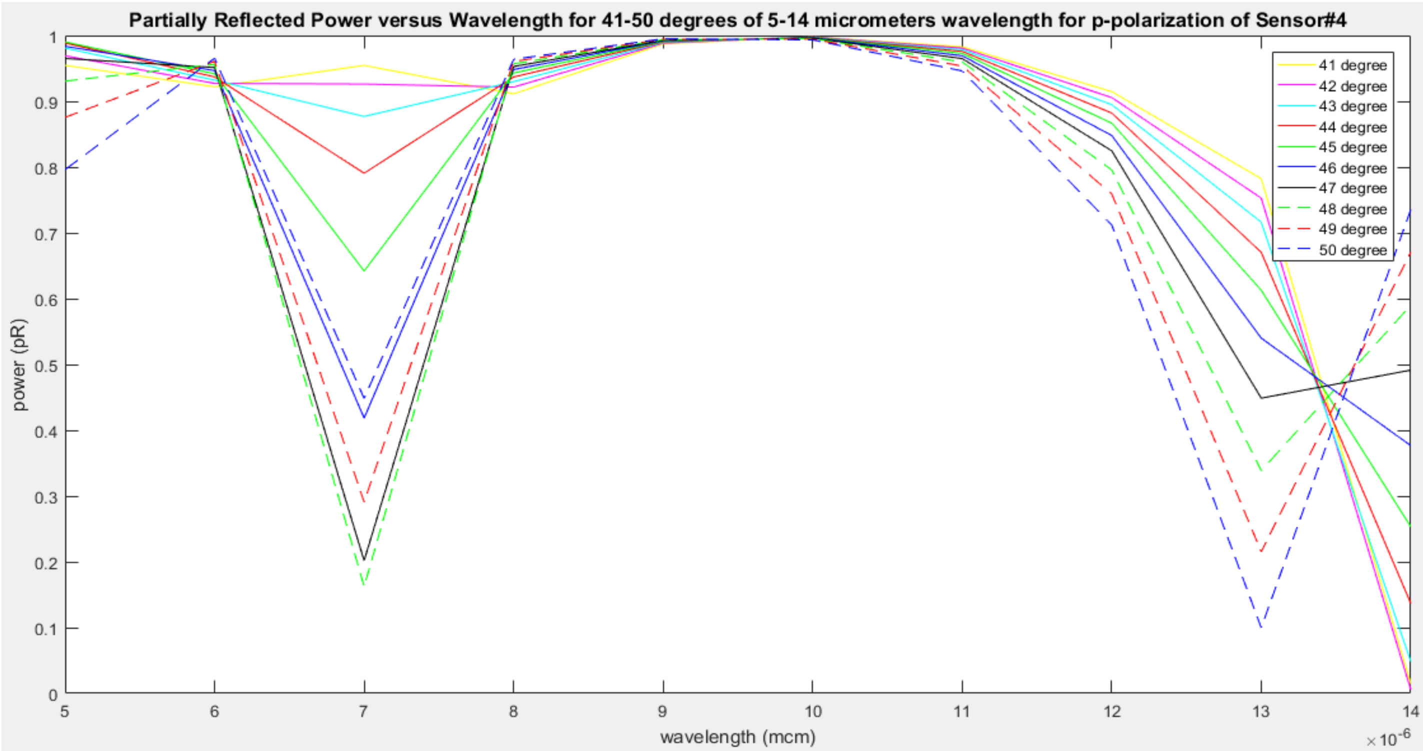


Figure 4-5-23 Partial Reflected Power versus 5-14 μm wavelength for 41-50 degrees of p-polarization

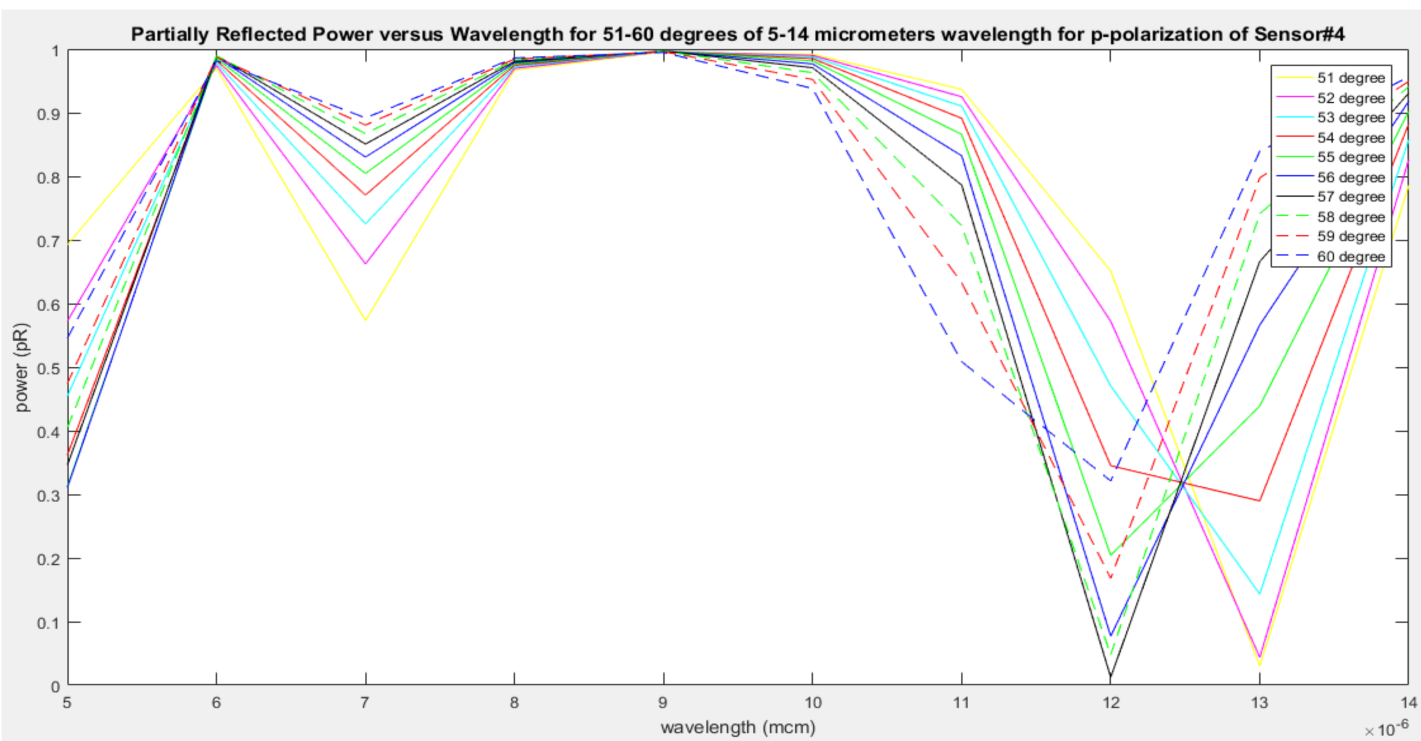


Figure 4-5-24 Partial Reflected Power versus 5-14 μm wavelength for 51-60 degrees of p-polarization

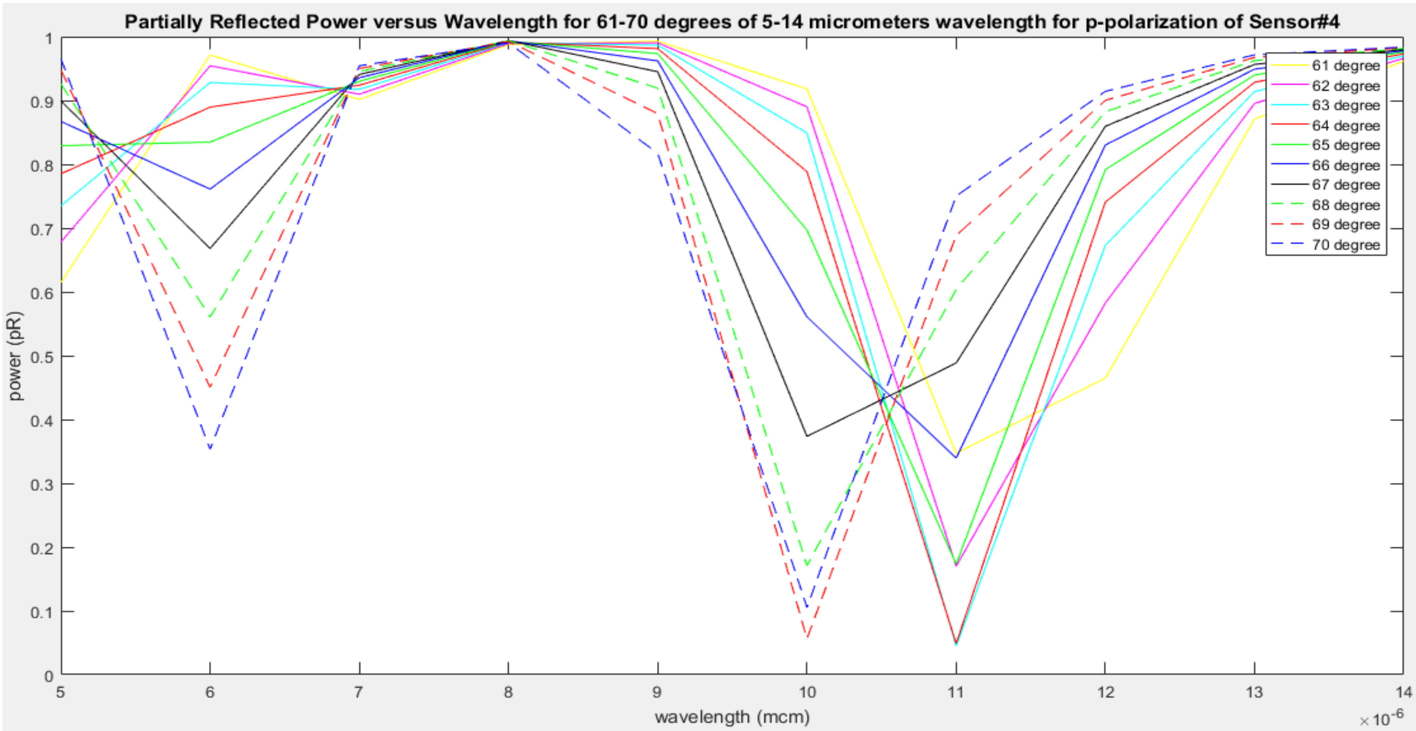


Figure 4-5-25 Partial Reflected Power versus 5-14 μm wavelength for 61-70 degrees of p-polarization

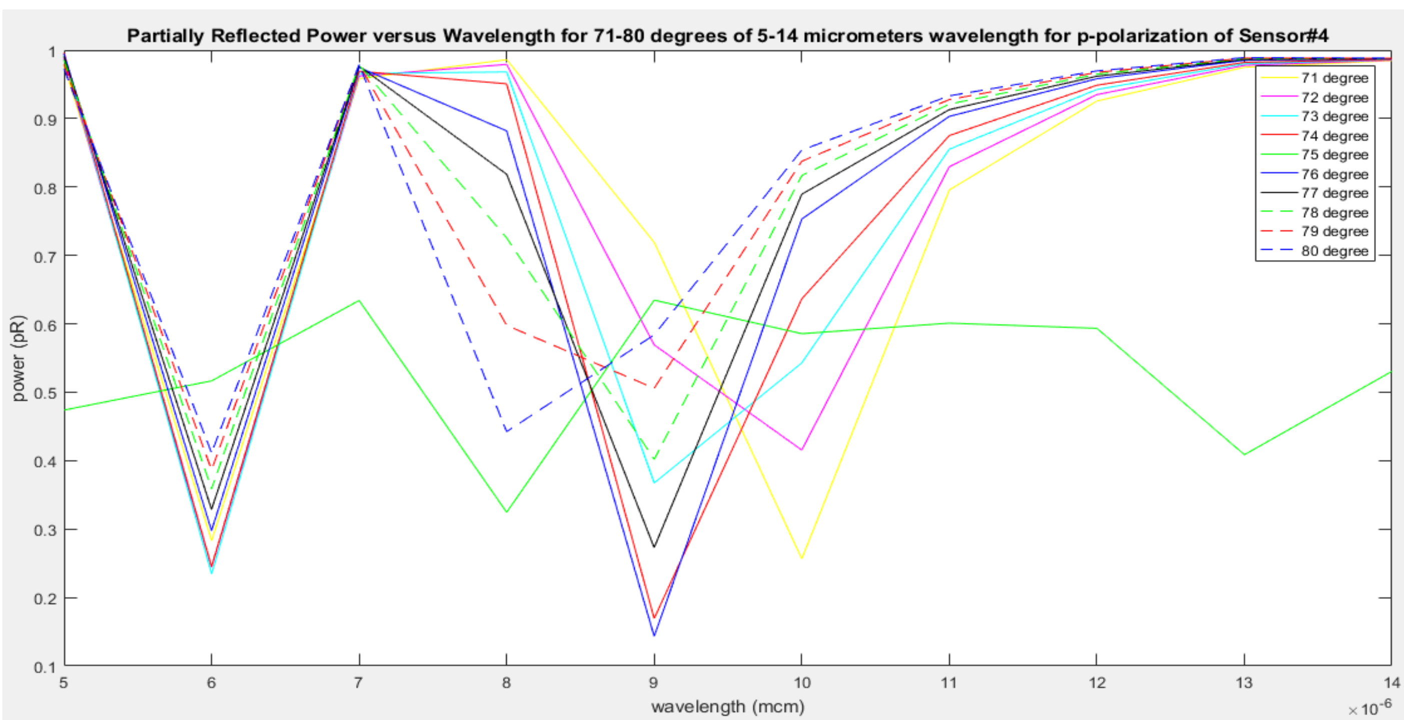


Figure 4-5-26 Partial Reflected Power versus 5-14 μm wavelength for 71-80 degrees of p-polarization

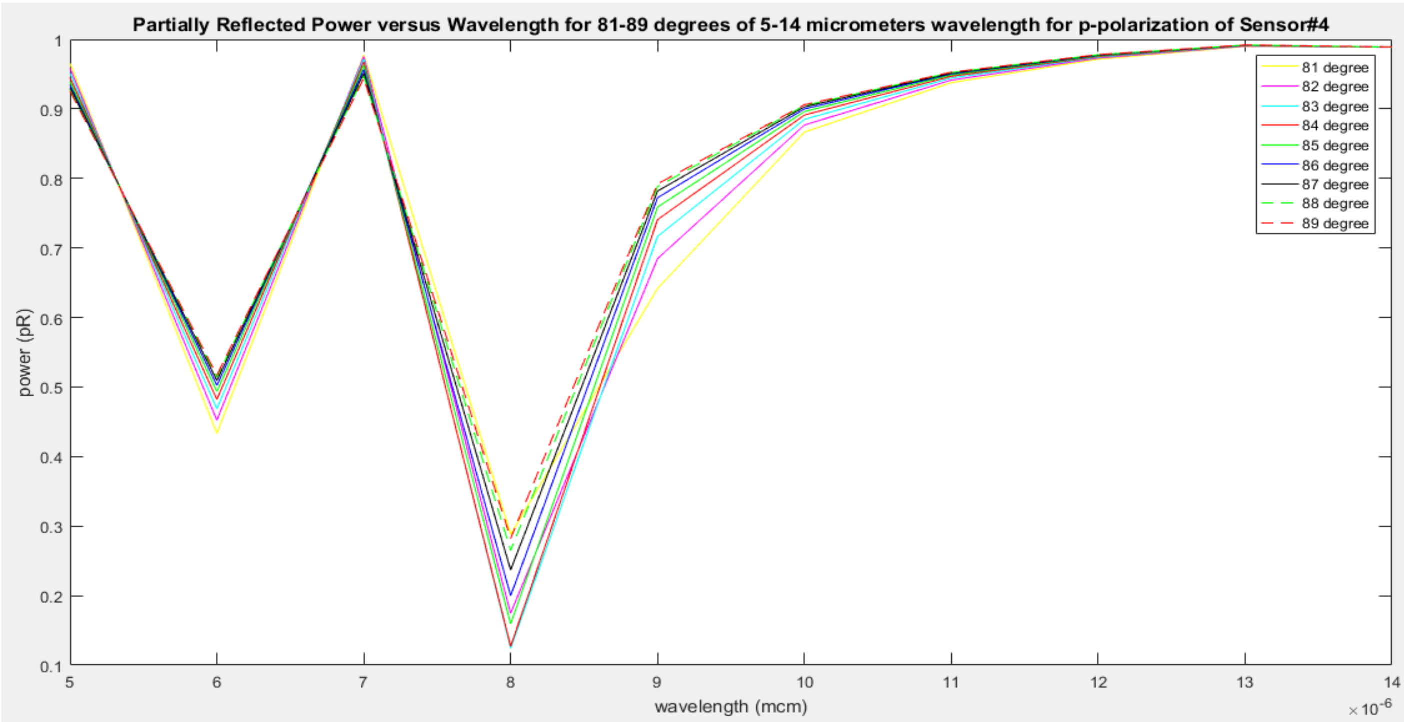


Figure 4-5-27 Partial Reflected Power versus 5-14 µm wavelength for 81-89 degrees of p-polarization

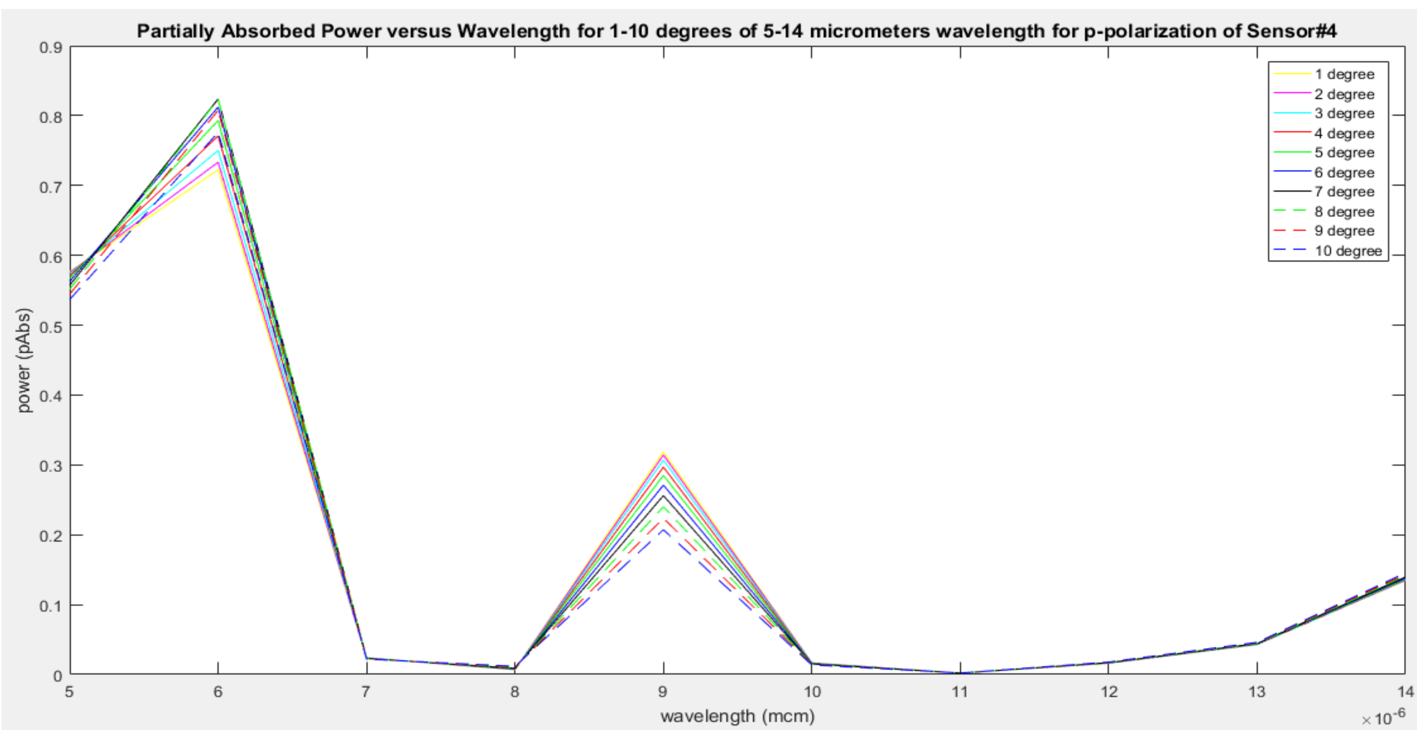


Figure 4-5-28 Partial Absorbed Power versus 5-14 µm wavelength for 1-10 degrees of p-polarization

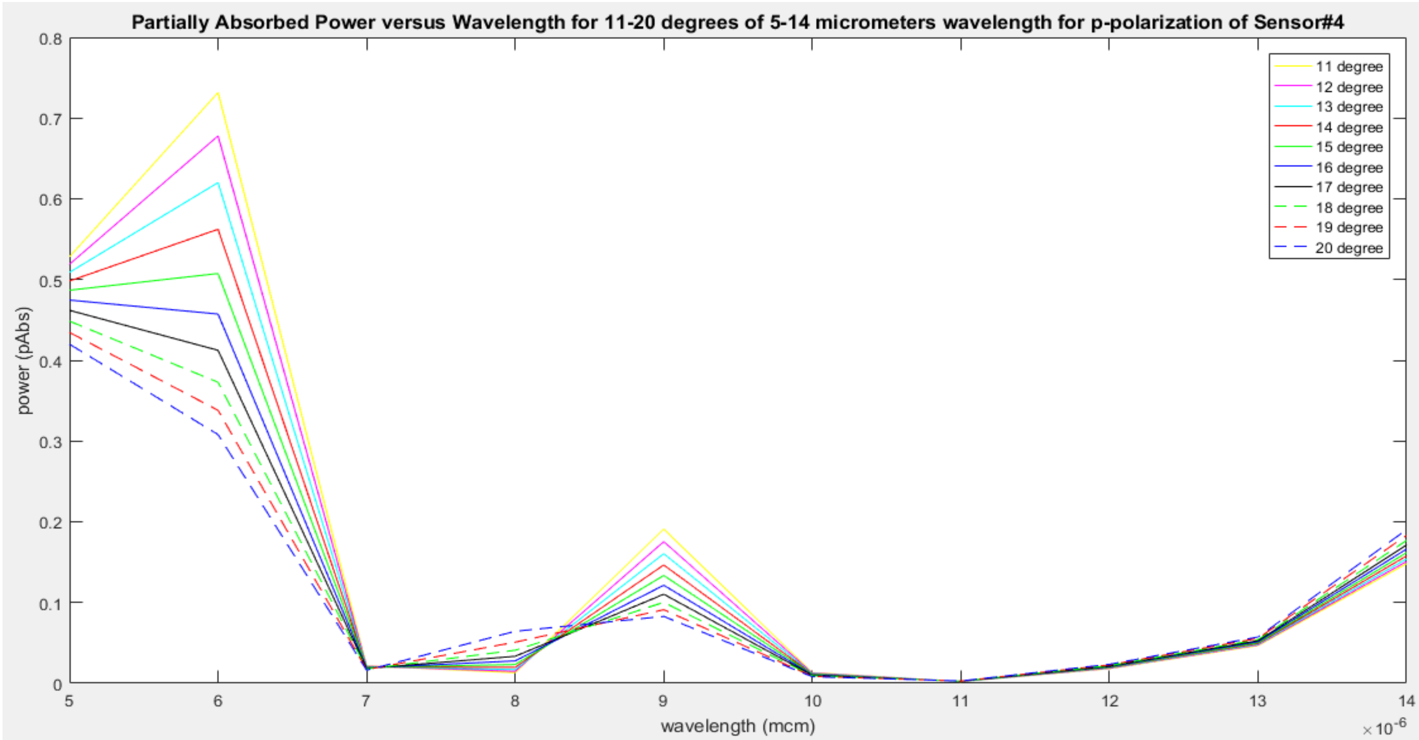


Figure 4-5-29 Partial Absorbed Power versus 5-14 µm wavelength for 11-20 degrees of p-polarization

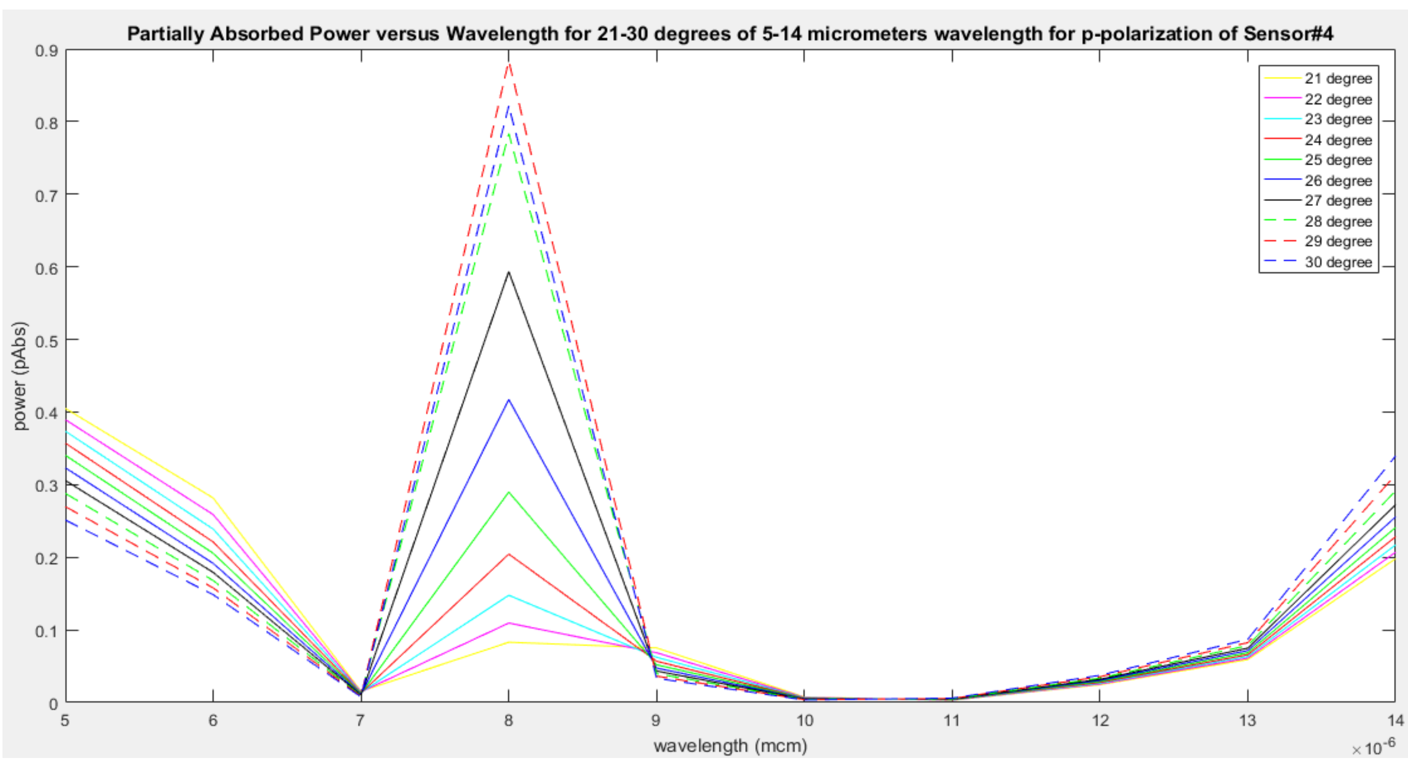


Figure 4-5-30 Partial Absorbed Power versus 5-14 µm wavelength for 21-30 degrees of p-polarization

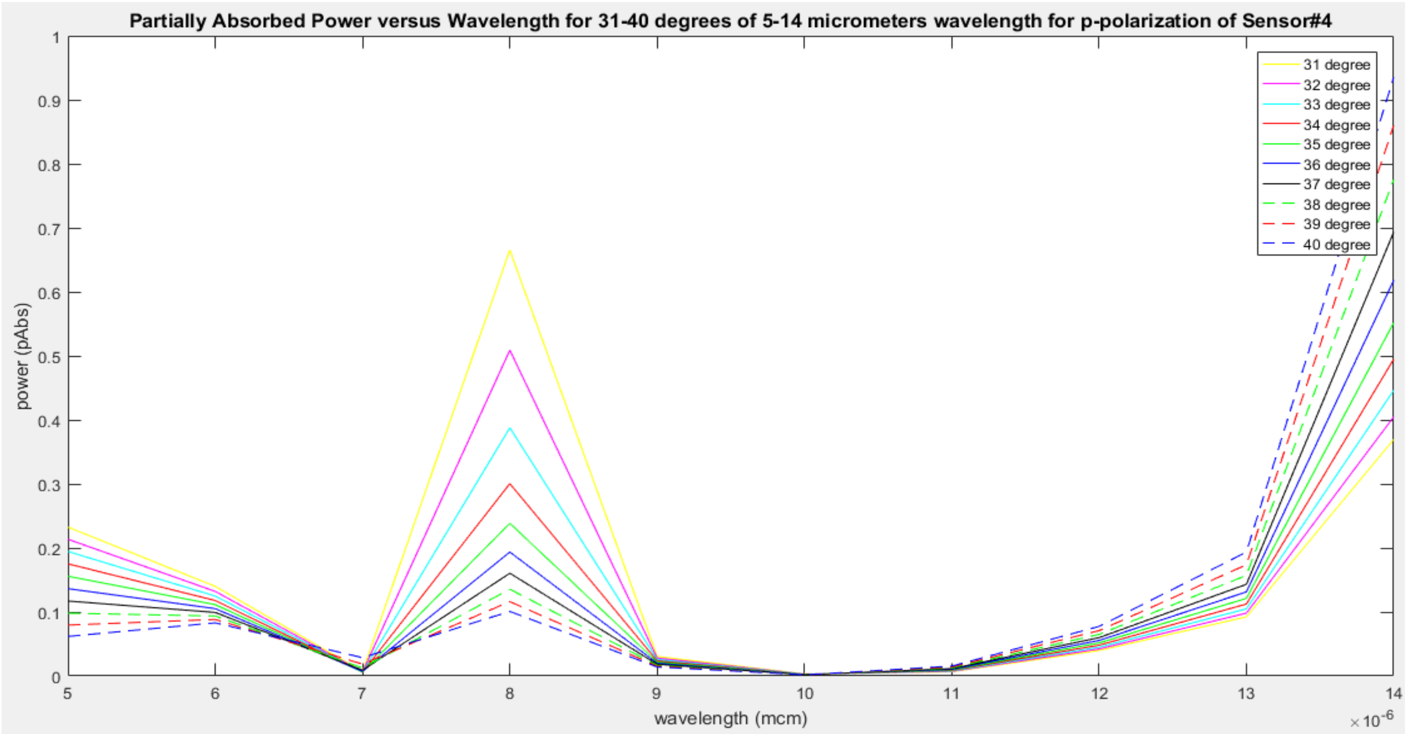


Figure 4-5-31 Partial Absorbed Power versus 5-14 µm wavelength for 31-40 degrees of p-polarization

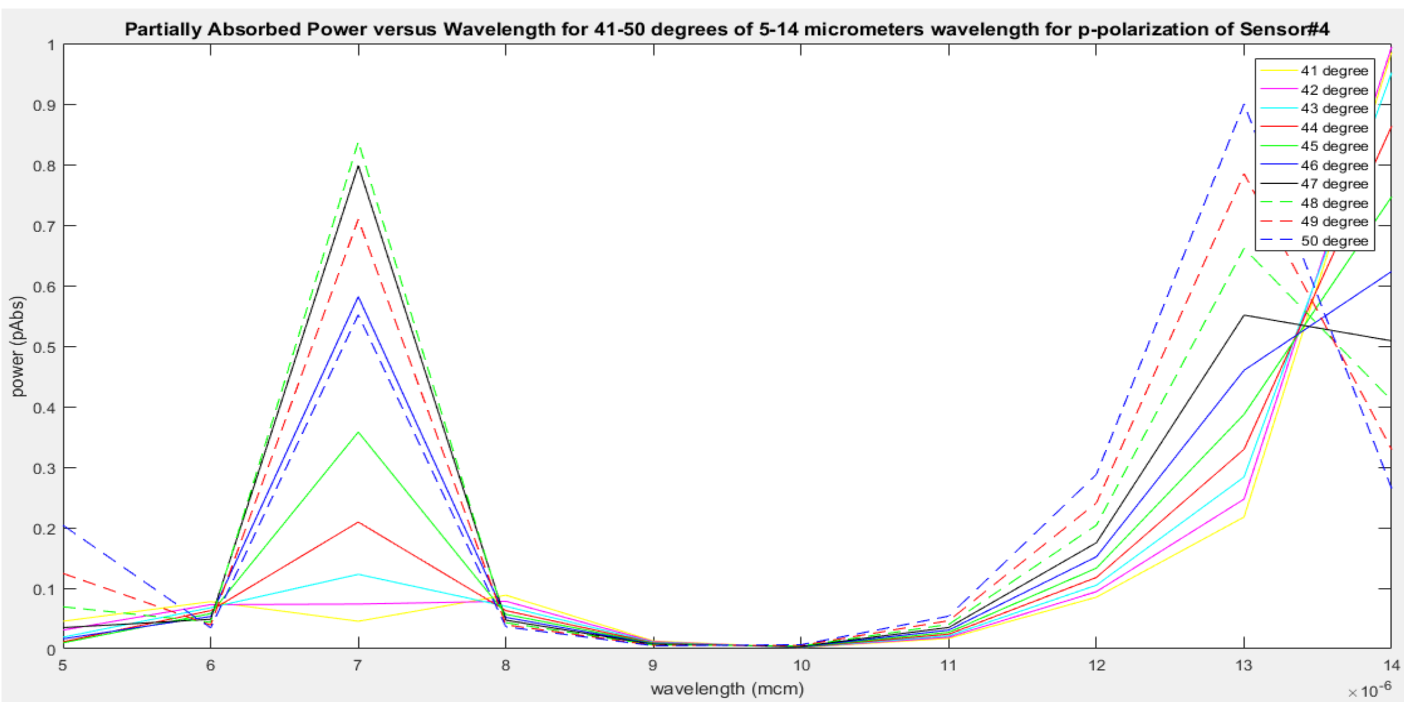


Figure 4-5-32 Partial Absorbed Power versus 5-14 µm wavelength for 41-50 degrees of p-polarization

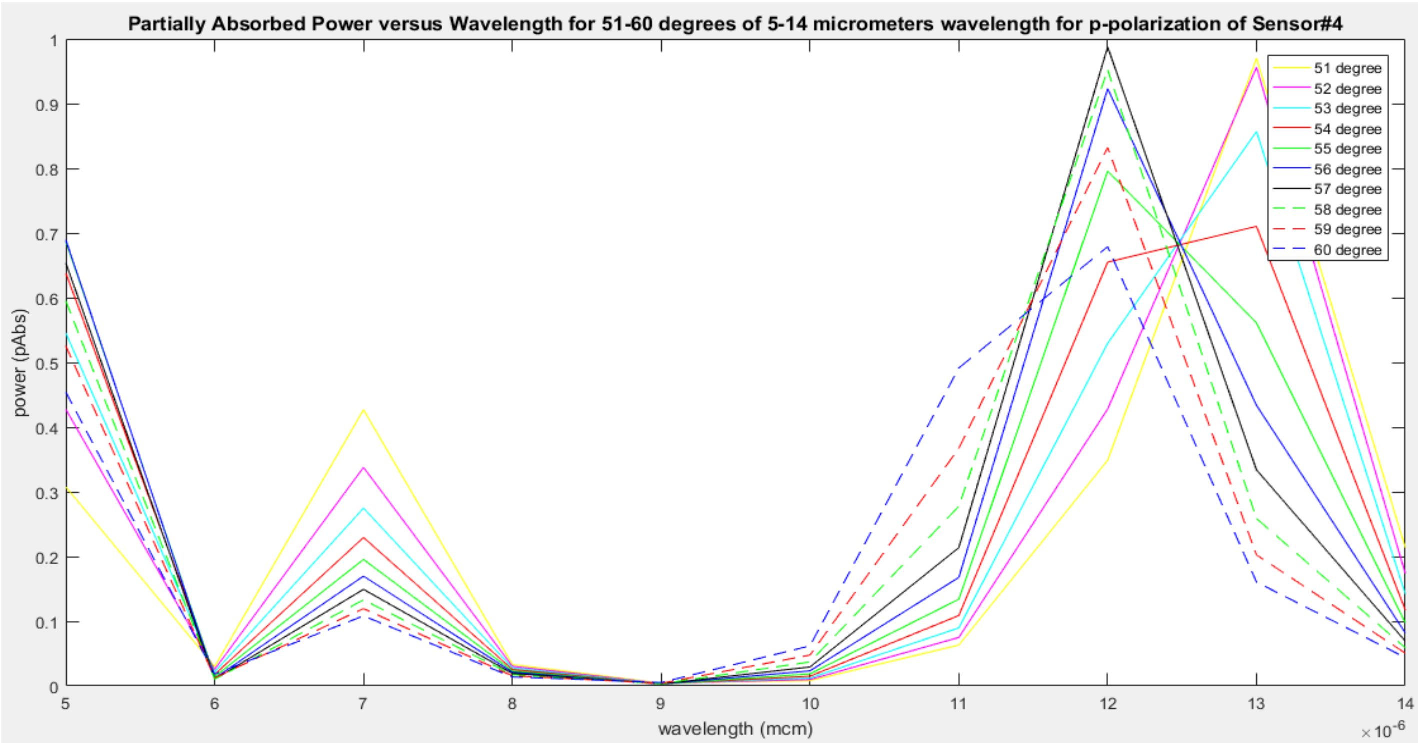


Figure 4-5-33 Partial Absorbed Power versus 5-14 µm wavelength for 51-60 degrees of p-polarization

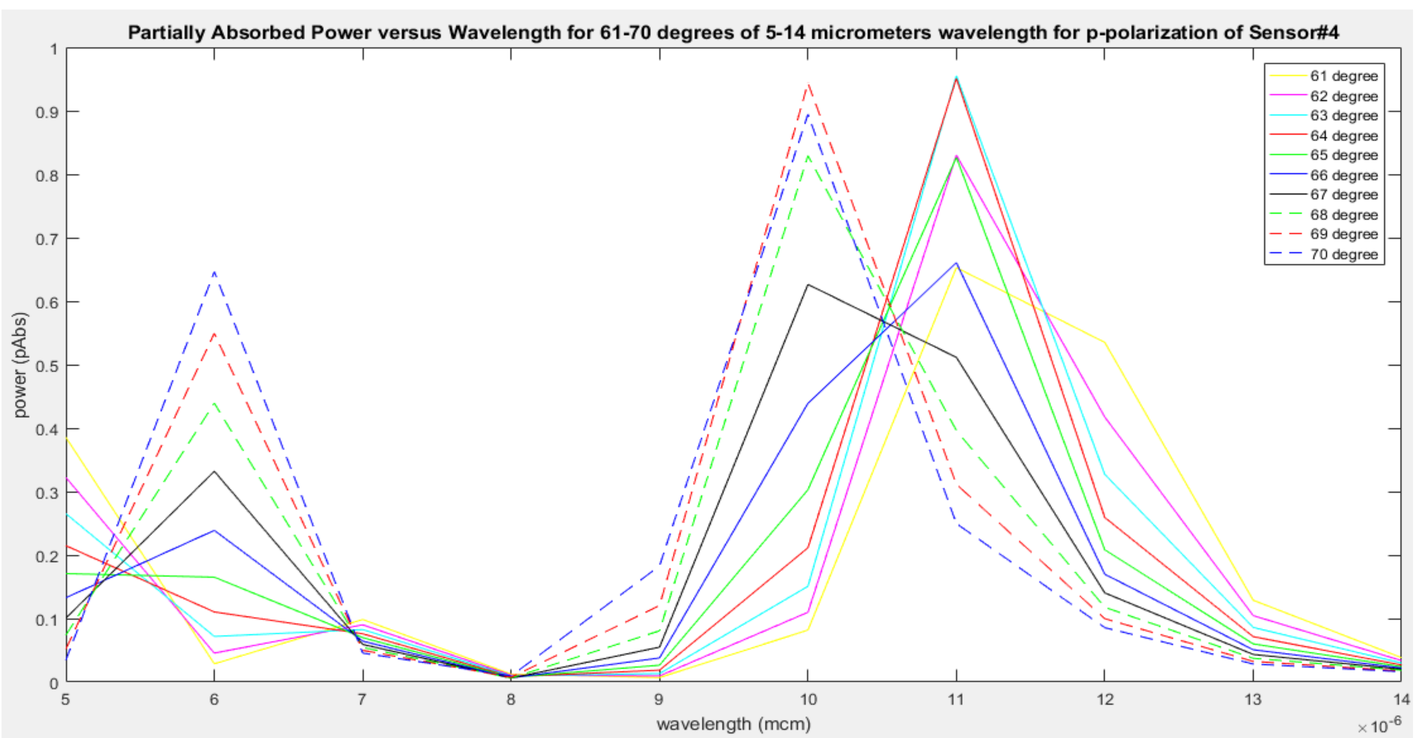


Figure 4-5-34 Partial Absorbed Power versus 5-14 µm wavelength for 61-70 degrees of p-polarization

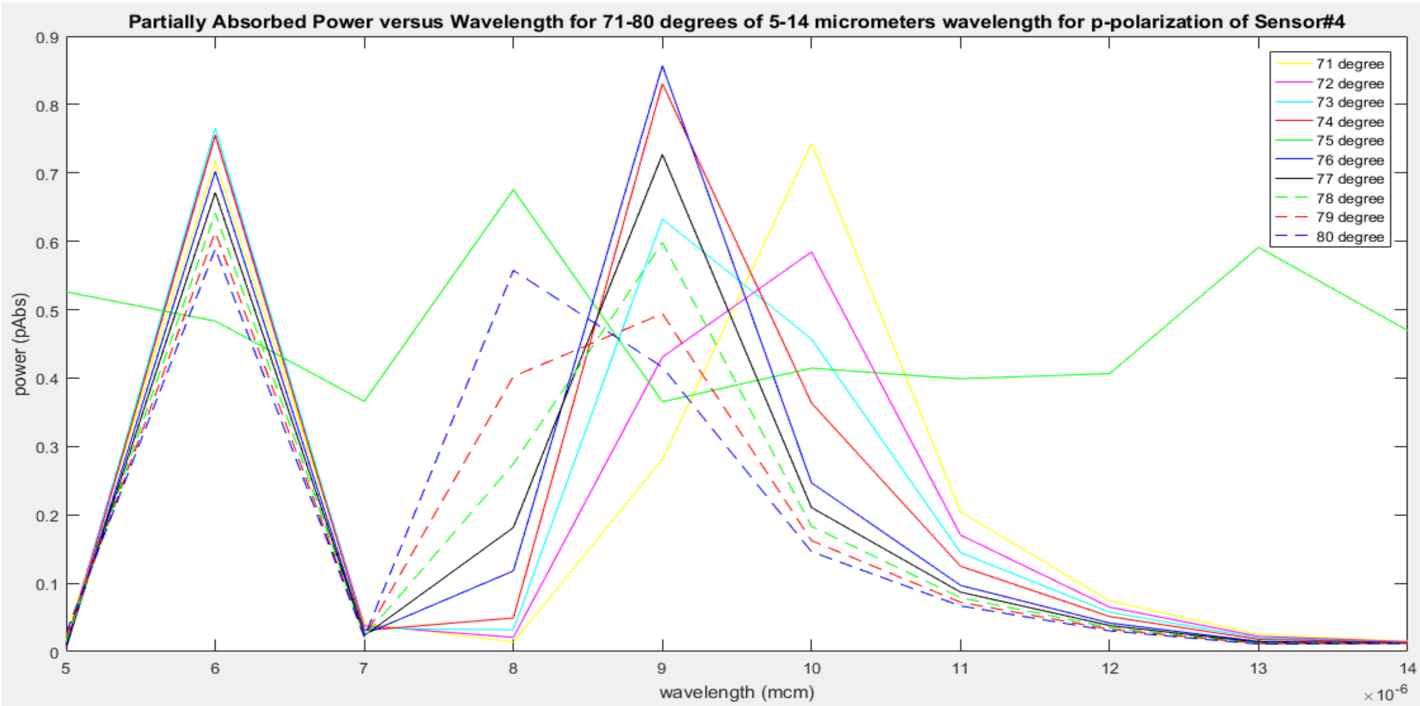


Figure 4-5-35 Partial Absorbed Power versus 5-14 μm wavelength for 71-80 degrees of p-polarization

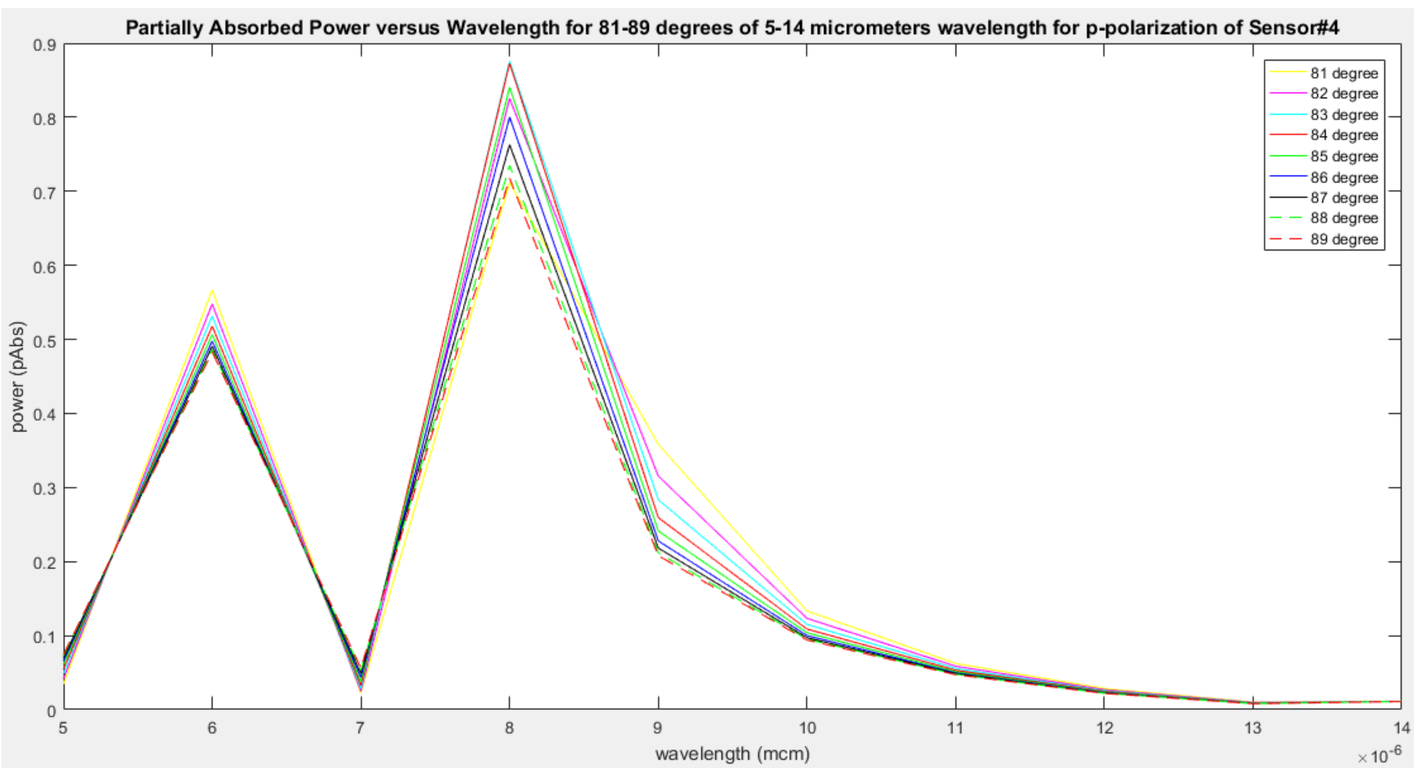


Figure 4-5-36 Partial Absorbed Power versus 5-14 μm wavelength for 81-89 degrees of p-polarization

4.5.1 Discussions

Table 4-5-1 Comparison of maximum and minimum partial reflected power values at the respective angles of incidence for s polarization across wavelengths of 5-14 µm

Wavelength (in µm)	s polarization – Minimum pr values	s polarization – Maximum pr values
5	0.4234 → 1^0	0.9875 → 50^0
6	0.1306 → 60^0	0.9708 → 56^0
7	0.2396 → 45^0	0.9946 → 36^0
8	0.1162 → 29^0	0.9961 → 860, 870, 880, 890
9	0.5432 → 75^0	0.9998 → 67^0, 68^0, 69^0, 70^0, 71^0, 72^0, 73^0, 74^0, 76^0, 79^0, 80^0, 81^0, 82^0, 83^0, 84^0, 85^0
10	0.5131 → 75^0	0.9993 → 41^0, 42^0
11	0.4745 → 75^0	0.9980 → 1^0 to 10^0
12	0.4080 → 75^0	0.9839 → 1^0
13	0.2722 → 75^0	0.9571 → 1^0
14	0.0373 → 60^0	0.8978 → 89^0

Table 4-5-2 Comparison of maximum and minimum partial absorbed power values at the respective angles of incidence for s polarization across wavelengths of 5-14 µm

Wavelength (in µm)	s-polarization -- Minimum pabs values	s-polarization – Maximum pabs values
5	0.0125 - 0.0000i → 50^0	0.6844 - 0.0000i → 56^0
6	0.0292 - 0.0000i → 56^0	0.8694 - 0.0000i → 60^0
7	0.0054 - 0.0000i → 36^0	0.7604 - 0.0000i → 45^0
8	0.0039 - 0.0000i → 86^0 to 89^0	0.7691 - 0.0000i → 30^0

9	0.0002 - 0.0000i → 67^0, 68^0, 69^0, 70^0, 71^0, 72^0, 73^0, 74^0, 76^0 to 85^0	0.4568 - 0.0000i → 75^0
10	0.0007 - 0.0000i → 41^0, 42^0	0.4869 - 0.0000i → 75^0
11	0.0020 - 0.0000i → 1^0 to 10^0	0.5255 - 0.0000i → 75^0
12	0.0161 - 0.0000i → 1^0	0.5920 - 0.0000i → 75^0
13	0.0429 - 0.0000i → 1^0	0.7278 - 0.0000i → 75^0
14	0.1022 - 0.0000i → 89^0	0.9627 - 0.0000i → 60^0

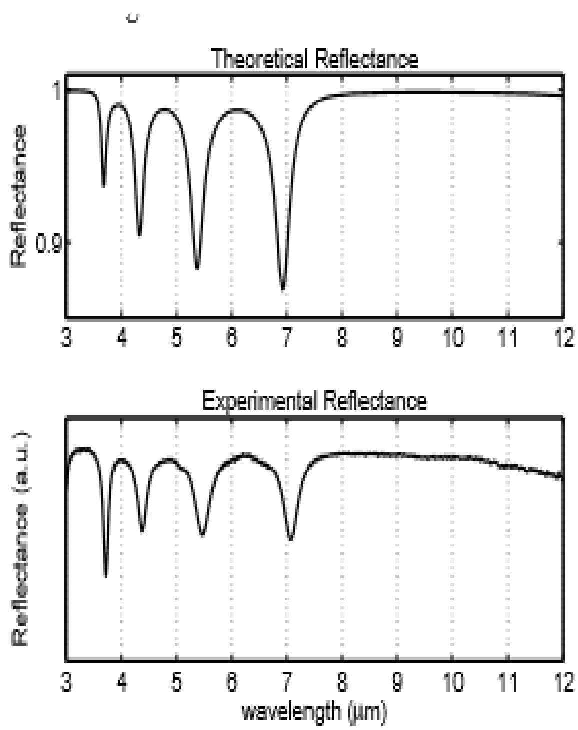
Table 4-5-3 Comparison of maximum and minimum partial reflected power values at the respective angles of incidence for p polarization across wavelengths of 5-14 µm

Wavelength (in µm)	p-polarization -- Minimum pr values	p-polarization – Maximum pr values
5	0.3108 → 56^0	0.9965 → 74^0
6	0.1762 → 7^0	0.9897 → 57^0
7	0.1624 → 48^0	0.9942 → 34^0
8	0.1162 → 29^0	0.9939 → 67^0
9	0.1432 → 76^0	0.9971 → 55^0, 56^0
10	0.0564 → 69^0	0.9982 → 39^0, 40^0
11	0.0450 → 63^0	0.9980 → 1^0 to 8^0
12	0.0125 → 57^0	0.9839 → 1^0
13	0.0301 → 51^0	0.9920 → 89^0
14	0.0057 → 42^0	0.9891 → 89^0

Table 4-5-4 Comparison of maximum and minimum partial absorbed power values at the respective angles of incidence for p polarization across wavelengths of 5-14 µm

Wavelength (in µm)	p-polarization -- Minimum pabs values	p-polarization – Maximum pabs values
5	0.0035 - 0.0000i → 74^0	0.6892 - 0.0000i → 56^0
6	0.0103 - 0.0000i → 57^0	0.8238 - 0.0000i → 7^0
7	0.0058 - 0.0000i → 34^0	0.8376 - 0.0000i → 48^0
8	0.0061 - 0.0000i → 67^0	0.8838 - 0.0000i → 29^0
9	0.0029 - 0.0000i → 55^0, 56^0	0.8568 - 0.0000i → 76^0
10	0.0018 - 0.0000i → 39^0, 40^0	0.9436 - 0.0000i → 69^0
11	0.0020 - 0.0000i → 1^0 to 8^0	0.9550 - 0.0000i → 63^0
12	0.0161 - 0.0000i → 1^0	0.9875 - 0.0000i → 57^0
13	0.0080 - 0.0000i → 89^0	0.9699 - 0.0000i → 51^0
14	0.0109 - 0.0000i → 89^0	0.9943 - 0.0000i → 42^0

A filter focuses on maximum reflection of incident radiation, since it will be fitted on the top of a microbolometer structure. For p-polarization the maximum reflected power magnitude is 0.9982 at 39^0-40^0 angle of incidence for wavelength of 10 µm. In case of s-polarization the maximum reflected power magnitude if 0.9998 at 67^0-85^0 angles of incidence for wavelength of 9 µm. For s-polarization the reflected power exhibited a magnitude of 0.4234, 0.2775, 0.9761, 0.9931, 0.6814, 0.9835, 0.9980, 0.9839, 0.9571, 0.8656 for range of wavelength from 5-14 µm at 1^0 angle of incidence. For the same polarization, the reflected power exhibited a magnitude of 0.9823, 0.9511, 0.9142, 0.9824, 0.9976, 0.9984, 0.9848, 0.9468, 0.9023, 0.4886 for range of wavelength from 5-14 µm at 51^0 angle of incidence. For the same polarization, the reflected power exhibited a magnitude of 0.7342, 0.9342, 0.9800, 0.9961, 0.9997, 0.9918, 0.9674, 0.9081, 0.7627, 0.8978 for range of wavelength from 5-14 µm at 89^0 angle of incidence. The range of values reflected at 51^0 are quite close to the values obtained for normal incidence, that is represented in the graph below. The range of values obtained for 1^0 angle of incidence hold almost true for 7-10 µm, when compared to the values obtained for normal incidence experimentally. The deviation of values for the lower wavelengths away from the values obtained experimentally and theoretically for normal incidence, maybe because of the reason that we have not considered the [A B; C D] matrices of the Cr material, that exists below Au layer. A reason for not considering the Cr material transmission matrix, is due to the fact, that Au has a near about 100% reflectivity and Cr acts like a gelling material, in the structure.



4.6 Conclusion

In this chapter, we highlighted the simulation results involving the plotting of partial reflected and partial absorbed power for wavelength range of 5-14 µm for s and p polarizations. Discussions involving the tabular data and the overall data collated during simulation process was also done. In some sensor structures an attempt to compare the values obtained during oblique incidence was done with that of normal incidence in the respective research paper. A thought was given to the design aspect of some of the sensor structures, by substituting the existing sensor layer materials with some other commonly used bolometric materials, helping to compare the performance of the overall sensor structure.

For a microbolometer the amount of absorbed power calculated is very important. The more the absorbed power the more the electrical signal, the better the performance. From the simulation results for s and p polarizations we obtained the maximum power from 5-14 µm wavelength for an angle of light that is incident in the sensor structure. The data collated is represented in the table 4-6-1 below:

Feature	Model I	Model 1	Model 2	Model 3	Model 4
Maximum partial absorbing power from 5-14 µm for s-polarization	0.9559-0.000i →8 µm → 73^0	0.9112-0.000i →7 µm → 1^0	0.9617-0.000i →9 µm → 66^0, 67^0	0.3057-0.000i → 8 µm → 1^0, 2^0, 3^0	0.9627-0.000i →14 µm → 60^0
Maximum partial absorbing power from 5-14 µm for p-polarization	0.9855-0.000i →8 µm → 68^0	0.9113-0.000i →7 µm → 1^0	0.9979-0.000i →8 µm → 73^0	0.3057-0.000i → 8 µm → 1^0, 2^0, 3^0	0.9982-0.000i →10 µm → 39^0, 40^0

The Table would significantly help the reader in fabrication of microbolometer at a certain angle, certain material composition, for a certain wavelength of light, to obtain the maximum absorbed power for the respective s or p polarization.

APPENDIX A

Simulation values of Matlab for Sensor Structure I

s-polarization

```
RP1 = [0.9287    0.8465    0.9338    0.8741    0.9668    0.9521    0.7167    0.7490    0.6145    0.5801]
RP2 = [0.9291    0.8469    0.9335    0.8750    0.9669    0.9520    0.7164    0.7490    0.6145    0.5799]
RP3 = [0.9299    0.8474    0.9329    0.8766    0.9670    0.9517    0.7160    0.7491    0.6144    0.5795]
RP4 = [0.9310    0.8482    0.9322    0.8787    0.9671    0.9514    0.7154    0.7491    0.6143    0.5790]
RP5 = [0.9323    0.8493    0.9311    0.8814    0.9673    0.9510    0.7148    0.7492    0.6141    0.5783]
RP6 = [0.9339    0.8506    0.9298    0.8846    0.9675    0.9505    0.7141    0.7493    0.6139    0.5775]
RP7 = [0.9356    0.8521    0.9282    0.8881    0.9678    0.9498    0.7135    0.7495    0.6137    0.5766]
RP8 = [0.9376    0.8539    0.9263    0.8920    0.9680    0.9489    0.7130    0.7496    0.6134    0.5755]
RP9 = [0.9397    0.8560    0.9240    0.8962    0.9684    0.9479    0.7128    0.7498    0.6131    0.5742]
RP10 = [0.9418    0.8583    0.9212    0.9006    0.9687    0.9467    0.7128    0.7500    0.6127    0.5728]
RP11 = [0.9441    0.8609    0.9179    0.9051    0.9690    0.9453    0.7132    0.7503    0.6124    0.5713]
RP12 = [0.9464    0.8638    0.9139    0.9097    0.9694    0.9435    0.7141    0.7506    0.6120    0.5697]
RP13 = [0.9487    0.8669    0.9092    0.9143    0.9698    0.9414    0.7154    0.7509    0.6116    0.5679]
RP14 = [0.9509    0.8703    0.9036    0.9189    0.9701    0.9389    0.7174    0.7512    0.6111    0.5660]
RP15 = [0.9532    0.8739    0.8969    0.9234    0.9705    0.9359    0.7199    0.7515    0.6106    0.5640]
RP16 = [0.9553    0.8777    0.8887    0.9278    0.9709    0.9324    0.7230    0.7519    0.6101    0.5618]
RP17 = [0.9574    0.8816    0.8788    0.9321    0.9712    0.9280    0.7266    0.7523    0.6096    0.5596]
RP18 = [0.9594    0.8857    0.8666    0.9361    0.9716    0.9228    0.7308    0.7527    0.6091    0.5573]
RP19 = [0.9613    0.8899    0.8515    0.9400    0.9719    0.9165    0.7355    0.7532    0.6085    0.5549]
RP20 = [0.9631    0.8941    0.8327    0.9437    0.9721    0.9088    0.7405    0.7536    0.6080    0.5524]
RP21 = [0.9647    0.8983    0.8088    0.9472    0.9723    0.8995    0.7459    0.7541    0.6074    0.5498]
RP22 = [0.9663    0.9025    0.7784    0.9504    0.9725    0.8881    0.7516    0.7547    0.6068    0.5471]
RP23 = [0.9677    0.9067    0.7394    0.9535    0.9725    0.8741    0.7574    0.7552    0.6062    0.5444]
RP24 = [0.9691    0.9107    0.6895    0.9563    0.9725    0.8570    0.7633    0.7558    0.6056    0.5416]
RP25 = [0.9703    0.9146    0.6269    0.9589    0.9724    0.8361    0.7693    0.7564    0.6049    0.5388]
RP26 = [0.9714    0.9183    0.5524    0.9614    0.9721    0.8107    0.7752    0.7570    0.6043    0.5359]
RP27 = [0.9725    0.9218    0.4742    0.9636    0.9716    0.7802    0.7811    0.7576    0.6037    0.5330]
RP28 = [0.9734    0.9251    0.4124    0.9657    0.9710    0.7440    0.7868    0.7582    0.6031    0.5301]
RP29 = [0.9742    0.9280    0.3946    0.9675    0.9701    0.7027    0.7924    0.7588    0.6024    0.5272]
RP30 = [0.9749    0.9307    0.4349    0.9692    0.9690    0.6576    0.7978    0.7595    0.6018    0.5243]
RP31 = [0.9756    0.9329    0.5169    0.9707    0.9675    0.6119    0.8030    0.7601    0.6012    0.5214]
RP32 = [0.9761    0.9348    0.6104    0.9721    0.9656    0.5705    0.8080    0.7608    0.6006    0.5185]
RP33 = [0.9766    0.9363    0.6941    0.9733    0.9631    0.5392    0.8127    0.7614    0.6000    0.5156]
RP34 = [0.9769    0.9373    0.7610    0.9743    0.9600    0.5227    0.8173    0.7621    0.5994    0.5128]
RP35 = [0.9772    0.9377    0.8118    0.9752    0.9561    0.5226    0.8216    0.7627    0.5988    0.5101]
RP36 = [0.9774    0.9374    0.8497    0.9759    0.9512    0.5373    0.8257    0.7634    0.5982    0.5074]
RP37 = [0.9774    0.9365    0.8780    0.9764    0.9450    0.5625    0.8296    0.7641    0.5976    0.5047]
RP38 = [0.9773    0.9346    0.8993    0.9768    0.9371    0.5936    0.8333    0.7647    0.5970    0.5021]
RP39 = [0.9770    0.9318    0.9156    0.9770    0.9270    0.6265    0.8368    0.7654    0.5965    0.4996]
RP40 = [0.9766    0.9278    0.9280    0.9771    0.9140    0.6587    0.8401    0.7660    0.5959    0.4972]
```

RP41 = [0.9759 0.9223 0.9378 0.9769 0.8973 0.6885 0.8432 0.7666 0.5954 0.4949]
RP42 = [0.9749 0.9151 0.9455 0.9766 0.8755 0.7154 0.8462 0.7673 0.5949 0.4926]
RP43 = [0.9734 0.9060 0.9516 0.9760 0.8470 0.7393 0.8489 0.7679 0.5944 0.4905]
RP44 = [0.9713 0.8947 0.9564 0.9752 0.8095 0.7602 0.8516 0.7685 0.5939 0.4885]
RP45 = [0.9682 0.8813 0.9604 0.9741 0.7602 0.7785 0.8541 0.7691 0.5934 0.4865]
RP46 = [0.9636 0.8662 0.9636 0.9727 0.6962 0.7945 0.8564 0.7696 0.5930 0.4847]
RP47 = [0.9566 0.8502 0.9661 0.9709 0.6154 0.8085 0.8587 0.7702 0.5925 0.4830]
RP48 = [0.9451 0.8351 0.9682 0.9687 0.5191 0.8207 0.8608 0.7708 0.5921 0.4814]
RP49 = [0.9255 0.8229 0.9699 0.9660 0.4162 0.8314 0.8628 0.7713 0.5917 0.4799]
RP50 = [0.8911 0.8157 0.9712 0.9627 0.3257 0.8409 0.8647 0.7718 0.5913 0.4785]
RP51 = [0.8363 0.8144 0.9722 0.9587 0.2715 0.8492 0.8664 0.7723 0.5909 0.4772]
RP52 = [0.7884 0.8189 0.9729 0.9538 0.2678 0.8566 0.8681 0.7728 0.5905 0.4760]
RP53 = [0.8108 0.8278 0.9734 0.9480 0.3090 0.8632 0.8697 0.7733 0.5901 0.4749]
RP54 = [0.8694 0.8392 0.9737 0.9408 0.3763 0.8692 0.8712 0.7738 0.5898 0.4739]
RP55 = [0.9120 0.8515 0.9738 0.9322 0.4511 0.8745 0.8727 0.7742 0.5895 0.4731]
RP56 = [0.9368 0.8637 0.9738 0.9217 0.5220 0.8792 0.8740 0.7747 0.5891 0.4723]
RP57 = [0.9512 0.8750 0.9735 0.9089 0.5840 0.8835 0.8753 0.7751 0.5888 0.4715]
RP58 = [0.9599 0.8852 0.9731 0.8931 0.6362 0.8874 0.8765 0.7755 0.5885 0.4709]
RP59 = [0.9655 0.8941 0.9725 0.8738 0.6794 0.8910 0.8777 0.7759 0.5882 0.4704]
RP60 = [0.9692 0.9020 0.9718 0.8499 0.7151 0.8942 0.8788 0.7763 0.5880 0.4699]
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RP62 = [0.9736 0.9145 0.9699 0.7838 0.7689 0.8999 0.8808 0.7770 0.5874 0.4692]
RP63 = [0.9749 0.9195 0.9687 0.7386 0.7893 0.9023 0.8817 0.7773 0.5872 0.4689]
RP64 = [0.9759 0.9238 0.9673 0.6832 0.8064 0.9046 0.8826 0.7777 0.5870 0.4687]
RP65 = [0.9766 0.9275 0.9658 0.6159 0.8209 0.9066 0.8834 0.7780 0.5868 0.4685]
RP66 = [0.9771 0.9307 0.9641 0.5361 0.8333 0.9086 0.8842 0.7783 0.5865 0.4684]
RP67 = [0.9774 0.9334 0.9623 0.4446 0.8439 0.9103 0.8849 0.7785 0.5863 0.4683]
RP68 = [0.9777 0.9358 0.9602 0.3451 0.8530 0.9119 0.8856 0.7788 0.5862 0.4683]
RP69 = [0.9778 0.9378 0.9580 0.2452 0.8609 0.9134 0.8862 0.7791 0.5860 0.4683]
RP70 = [0.9779 0.9395 0.9557 0.1555 0.8679 0.9148 0.8869 0.7793 0.5858 0.4683]
RP71 = [0.9780 0.9410 0.9532 0.0877 0.8739 0.9160 0.8874 0.7795 0.5856 0.4684]
RP72 = [0.9779 0.9423 0.9505 0.0500 0.8792 0.9172 0.8880 0.7797 0.5855 0.4684]
RP73 = [0.9779 0.9433 0.9477 0.0441 0.8839 0.9183 0.8885 0.7799 0.5853 0.4685]
RP74 = [0.9778 0.9443 0.9447 0.0654 0.8880 0.9192 0.8889 0.7801 0.5852 0.4686]
RP75 = [0.9777 0.9450 0.9417 0.1056 0.8917 0.9201 0.8894 0.7803 0.5851 0.4687]
RP76 = [0.9776 0.9457 0.9385 0.1561 0.8949 0.9209 0.8898 0.7804 0.5850 0.4689]
RP77 = [0.9775 0.9462 0.9353 0.2099 0.8978 0.9217 0.8901 0.7806 0.5849 0.4690]
RP78 = [0.9774 0.9467 0.9321 0.2624 0.9003 0.9224 0.8905 0.7807 0.5848 0.4691]
RP79 = [0.9772 0.9471 0.9289 0.3111 0.9025 0.9230 0.8908 0.7809 0.5847 0.4692]
RP80 = [0.9771 0.9474 0.9257 0.3547 0.9045 0.9235 0.8910 0.7810 0.5846 0.4694]
RP81 = [0.9770 0.9476 0.9226 0.3927 0.9062 0.9240 0.8913 0.7811 0.5845 0.4695]
RP82 = [0.9768 0.9478 0.9197 0.4253 0.9077 0.9244 0.8915 0.7812 0.5844 0.4696]
RP83 = [0.9767 0.9480 0.9170 0.4529 0.9090 0.9248 0.8917 0.7813 0.5844 0.4697]
RP84 = [0.9766 0.9481 0.9145 0.4758 0.9100 0.9251 0.8919 0.7813 0.5843 0.4698]
RP85 = [0.9765 0.9482 0.9123 0.4944 0.9109 0.9254 0.8920 0.7814 0.5843 0.4699]
RP86 = [0.9764 0.9482 0.9104 0.5091 0.9117 0.9256 0.8921 0.7814 0.5843 0.4699]
RP87 = [0.9764 0.9483 0.9089 0.5202 0.9122 0.9258 0.8922 0.7815 0.5842 0.4700]

RP88 = [0.9763 0.9483 0.9078 0.5280 0.9126 0.9259 0.8923 0.7815 0.5842 0.4700]
RP89 = [0.9763 0.9483 0.9072 0.5326 0.9128 0.9260 0.8923 0.7815 0.5842 0.4700]

AP1 = [0.0713 - 0.0000i 0.1535 - 0.0000i 0.0662 - 0.0000i 0.1259 - 0.0000i 0.0332 - 0.0000i 0.0479 - 0.0000i 0.2833 - 0.0000i 0.2510 - 0.0000i 0.3855 - 0.0000i 0.4199 - 0.0000i]
AP2 = [0.0709 - 0.0000i 0.1531 - 0.0000i 0.0665 - 0.0000i 0.1250 - 0.0000i 0.0331 - 0.0000i 0.0480 - 0.0000i 0.2836 - 0.0000i 0.2510 - 0.0000i 0.3855 - 0.0000i 0.4201 - 0.0000i]
AP3 = [0.0701 - 0.0000i 0.1526 - 0.0000i 0.0671 - 0.0000i 0.1234 - 0.0000i 0.0330 - 0.0000i 0.0483 - 0.0000i 0.2840 - 0.0000i 0.2509 - 0.0000i 0.3856 - 0.0000i 0.4205 - 0.0000i]
AP4 = [0.0690 - 0.0000i 0.1518 - 0.0000i 0.0678 - 0.0000i 0.1213 - 0.0000i 0.0329 - 0.0000i 0.0486 - 0.0000i 0.2846 - 0.0000i 0.2509 - 0.0000i 0.3857 - 0.0000i 0.4210 - 0.0000i]
AP5 = [0.0677 - 0.0000i 0.1507 - 0.0000i 0.0689 - 0.0000i 0.1186 - 0.0000i 0.0327 - 0.0000i 0.0490 - 0.0000i 0.2852 - 0.0000i 0.2508 - 0.0000i 0.3859 - 0.0000i 0.4217 - 0.0000i]
AP6 = [0.0661 - 0.0000i 0.1494 - 0.0000i 0.0702 - 0.0000i 0.1154 - 0.0000i 0.0325 - 0.0000i 0.0495 - 0.0000i 0.2859 - 0.0000i 0.2507 - 0.0000i 0.3861 - 0.0000i 0.4225 - 0.0000i]
AP7 = [0.0644 - 0.0000i 0.1479 - 0.0000i 0.0718 - 0.0000i 0.1119 - 0.0000i 0.0322 - 0.0000i 0.0502 - 0.0000i 0.2865 - 0.0000i 0.2505 - 0.0000i 0.3863 - 0.0000i 0.4234 - 0.0000i]
AP8 = [0.0624 - 0.0000i 0.1461 - 0.0000i 0.0737 - 0.0000i 0.1080 - 0.0000i 0.0320 - 0.0000i 0.0511 - 0.0000i 0.2870 - 0.0000i 0.2504 - 0.0000i 0.3866 - 0.0000i 0.4245 - 0.0000i]
AP9 = [0.0603 - 0.0000i 0.1440 - 0.0000i 0.0760 - 0.0000i 0.1038 - 0.0000i 0.0316 - 0.0000i 0.0521 - 0.0000i 0.2872 - 0.0000i 0.2502 - 0.0000i 0.3869 - 0.0000i 0.4258 - 0.0000i]
AP10 = [0.0582 - 0.0000i 0.1417 - 0.0000i 0.0788 - 0.0000i 0.0994 - 0.0000i 0.0313 - 0.0000i 0.0533 - 0.0000i 0.2872 - 0.0000i 0.2500 - 0.0000i 0.3873 - 0.0000i 0.4272 - 0.0000i]
AP11 = [0.0559 - 0.0000i 0.1391 - 0.0000i 0.0821 - 0.0000i 0.0949 - 0.0000i 0.0310 - 0.0000i 0.0547 - 0.0000i 0.2868 - 0.0000i 0.2497 - 0.0000i 0.3876 - 0.0000i 0.4287 - 0.0000i]
AP12 = [0.0536 - 0.0000i 0.1362 - 0.0000i 0.0861 - 0.0000i 0.0903 - 0.0000i 0.0306 - 0.0000i 0.0565 - 0.0000i 0.2859 - 0.0000i 0.2494 - 0.0000i 0.3880 - 0.0000i 0.4303 - 0.0000i]
AP13 = [0.0513 - 0.0000i 0.1331 - 0.0000i 0.0908 - 0.0000i 0.0857 - 0.0000i 0.0302 - 0.0000i 0.0586 - 0.0000i 0.2846 - 0.0000i 0.2491 - 0.0000i 0.3884 - 0.0000i 0.4321 - 0.0000i]
AP14 = [0.0491 - 0.0000i 0.1297 - 0.0000i 0.0964 - 0.0000i 0.0811 - 0.0000i 0.0299 - 0.0000i 0.0611 - 0.0000i 0.2826 - 0.0000i 0.2488 - 0.0000i 0.3889 - 0.0000i 0.4340 - 0.0000i]
AP15 = [0.0468 - 0.0000i 0.1261 - 0.0000i 0.1031 - 0.0000i 0.0766 - 0.0000i 0.0295 - 0.0000i 0.0641 - 0.0000i 0.2801 - 0.0000i 0.2485 - 0.0000i 0.3894 - 0.0000i 0.4360 - 0.0000i]
AP16 = [0.0447 - 0.0000i 0.1223 - 0.0000i 0.1113 - 0.0000i 0.0722 - 0.0000i 0.0291 - 0.0000i 0.0676 - 0.0000i 0.2770 - 0.0000i 0.2481 - 0.0000i 0.3899 - 0.0000i 0.4382 - 0.0000i]
AP17 = [0.0426 - 0.0000i 0.1184 - 0.0000i 0.1212 - 0.0000i 0.0679 - 0.0000i 0.0288 - 0.0000i 0.0720 - 0.0000i 0.2734 - 0.0000i 0.2477 - 0.0000i 0.3904 - 0.0000i 0.4404 - 0.0000i]
AP18 = [0.0406 - 0.0000i 0.1143 - 0.0000i 0.1334 - 0.0000i 0.0639 - 0.0000i 0.0284 - 0.0000i 0.0772 - 0.0000i 0.2692 - 0.0000i 0.2473 - 0.0000i 0.3909 - 0.0000i 0.4427 - 0.0000i]
AP19 = [0.0387 - 0.0000i 0.1101 - 0.0000i 0.1485 - 0.0000i 0.0600 - 0.0000i 0.0281 - 0.0000i 0.0835 - 0.0000i 0.2645 - 0.0000i 0.2468 - 0.0000i 0.3915 - 0.0000i 0.4451 - 0.0000i]
AP20 = [0.0369 - 0.0000i 0.1059 - 0.0000i 0.1673 - 0.0000i 0.0563 - 0.0000i 0.0279 - 0.0000i 0.0912 - 0.0000i 0.2595 - 0.0000i 0.2464 - 0.0000i 0.3920 - 0.0000i 0.4476 - 0.0000i]
AP21 = [0.0353 - 0.0000i 0.1017 - 0.0000i 0.1912 - 0.0000i 0.0528 - 0.0000i 0.0277 - 0.0000i 0.1005 - 0.0000i 0.2541 - 0.0000i 0.2459 - 0.0000i 0.3926 - 0.0000i 0.4502 - 0.0000i]
AP22 = [0.0337 - 0.0000i 0.0975 - 0.0000i 0.2216 - 0.0000i 0.0496 - 0.0000i 0.0275 - 0.0000i 0.1119 - 0.0000i 0.2484 - 0.0000i 0.2453 - 0.0000i 0.3932 - 0.0000i 0.4529 - 0.0000i]
AP23 = [0.0323 - 0.0000i 0.0933 - 0.0000i 0.2606 - 0.0000i 0.0465 - 0.0000i 0.0275 - 0.0000i 0.1259 - 0.0000i 0.2426 - 0.0000i 0.2448 - 0.0000i 0.3938 - 0.0000i 0.4556 - 0.0000i]
AP24 = [0.0309 - 0.0000i 0.0893 - 0.0000i 0.3105 - 0.0000i 0.0437 - 0.0000i 0.0275 - 0.0000i 0.1430 - 0.0000i 0.2367 - 0.0000i 0.2442 - 0.0000i 0.3944 - 0.0000i 0.4584 - 0.0000i]

AP25 = [0.0297 - 0.0000i 0.0854 - 0.0000i 0.3731 - 0.0000i 0.0411 - 0.0000i 0.0276 - 0.0000i 0.1639 - 0.0000i 0.2307 - 0.0000i 0.2436 - 0.0000i 0.3951 - 0.0000i 0.4612 - 0.0000i]
AP26 = [0.0286 - 0.0000i 0.0817 - 0.0000i 0.4476 - 0.0000i 0.0386 - 0.0000i 0.0279 - 0.0000i 0.1893 - 0.0000i 0.2248 - 0.0000i 0.2430 - 0.0000i 0.3957 - 0.0000i 0.4641 - 0.0000i]
AP27 = [0.0275 - 0.0000i 0.0782 - 0.0000i 0.5258 - 0.0000i 0.0364 - 0.0000i 0.0284 - 0.0000i 0.2198 - 0.0000i 0.2189 - 0.0000i 0.2424 - 0.0000i 0.3963 - 0.0000i 0.4670 - 0.0000i]
AP28 = [0.0266 - 0.0000i 0.0749 - 0.0000i 0.5876 - 0.0000i 0.0343 - 0.0000i 0.0290 - 0.0000i 0.2560 - 0.0000i 0.2132 - 0.0000i 0.2418 - 0.0000i 0.3969 - 0.0000i 0.4699 - 0.0000i]
AP29 = [0.0258 - 0.0000i 0.0720 - 0.0000i 0.6054 - 0.0000i 0.0325 - 0.0000i 0.0299 - 0.0000i 0.2973 - 0.0000i 0.2076 - 0.0000i 0.2412 - 0.0000i 0.3976 - 0.0000i 0.4728 - 0.0000i]
AP30 = [0.0251 - 0.0000i 0.0693 - 0.0000i 0.5651 - 0.0000i 0.0308 - 0.0000i 0.0310 - 0.0000i 0.3424 - 0.0000i 0.2022 - 0.0000i 0.2405 - 0.0000i 0.3982 - 0.0000i 0.4757 - 0.0000i]
AP31 = [0.0244 - 0.0000i 0.0671 - 0.0000i 0.4831 - 0.0000i 0.0293 - 0.0000i 0.0325 - 0.0000i 0.3881 - 0.0000i 0.1970 - 0.0000i 0.2399 - 0.0000i 0.3988 - 0.0000i 0.4786 - 0.0000i]
AP32 = [0.0239 - 0.0000i 0.0652 - 0.0000i 0.3896 - 0.0000i 0.0279 - 0.0000i 0.0344 - 0.0000i 0.4295 - 0.0000i 0.1920 - 0.0000i 0.2392 - 0.0000i 0.3994 - 0.0000i 0.4815 - 0.0000i]
AP33 = [0.0234 - 0.0000i 0.0637 - 0.0000i 0.3059 - 0.0000i 0.0267 - 0.0000i 0.0369 - 0.0000i 0.4608 - 0.0000i 0.1873 - 0.0000i 0.2386 - 0.0000i 0.4000 - 0.0000i 0.4844 - 0.0000i]
AP34 = [0.0231 - 0.0000i 0.0627 - 0.0000i 0.2390 - 0.0000i 0.0257 - 0.0000i 0.0400 - 0.0000i 0.4773 - 0.0000i 0.1827 - 0.0000i 0.2379 - 0.0000i 0.4006 - 0.0000i 0.4872 - 0.0000i]
AP35 = [0.0228 - 0.0000i 0.0623 - 0.0000i 0.1882 - 0.0000i 0.0248 - 0.0000i 0.0439 - 0.0000i 0.4774 - 0.0000i 0.1784 - 0.0000i 0.2373 - 0.0000i 0.4012 - 0.0000i 0.4899 - 0.0000i]
AP36 = [0.0226 - 0.0000i 0.0626 - 0.0000i 0.1503 - 0.0000i 0.0241 - 0.0000i 0.0488 - 0.0000i 0.4627 - 0.0000i 0.1743 - 0.0000i 0.2366 - 0.0000i 0.4018 - 0.0000i 0.4926 - 0.0000i]
AP37 = [0.0226 - 0.0000i 0.0635 - 0.0000i 0.1220 - 0.0000i 0.0236 - 0.0000i 0.0550 - 0.0000i 0.4375 - 0.0000i 0.1704 - 0.0000i 0.2359 - 0.0000i 0.4024 - 0.0000i 0.4953 - 0.0000i]
AP38 = [0.0227 - 0.0000i 0.0654 - 0.0000i 0.1007 - 0.0000i 0.0232 - 0.0000i 0.0629 - 0.0000i 0.4064 - 0.0000i 0.1667 - 0.0000i 0.2353 - 0.0000i 0.4030 - 0.0000i 0.4979 - 0.0000i]
AP39 = [0.0230 - 0.0000i 0.0682 - 0.0000i 0.0844 - 0.0000i 0.0230 - 0.0000i 0.0730 - 0.0000i 0.3735 - 0.0000i 0.1632 - 0.0000i 0.2346 - 0.0000i 0.4035 - 0.0000i 0.5004 - 0.0000i]
AP40 = [0.0234 - 0.0000i 0.0722 - 0.0000i 0.0720 - 0.0000i 0.0229 - 0.0000i 0.0860 - 0.0000i 0.3413 - 0.0000i 0.1599 - 0.0000i 0.2340 - 0.0000i 0.4041 - 0.0000i 0.5028 - 0.0000i]
AP41 = [0.0241 - 0.0000i 0.0777 - 0.0000i 0.0622 - 0.0000i 0.0231 - 0.0000i 0.1027 - 0.0000i 0.3115 - 0.0000i 0.1568 - 0.0000i 0.2334 - 0.0000i 0.4046 - 0.0000i 0.5051 - 0.0000i]
AP42 = [0.0251 - 0.0000i 0.0849 - 0.0000i 0.0545 - 0.0000i 0.0234 - 0.0000i 0.1245 - 0.0000i 0.2846 - 0.0000i 0.1538 - 0.0000i 0.2327 - 0.0000i 0.4051 - 0.0000i 0.5074 - 0.0000i]
AP43 = [0.0266 - 0.0000i 0.0940 - 0.0000i 0.0484 - 0.0000i 0.0240 - 0.0000i 0.1530 - 0.0000i 0.2607 - 0.0000i 0.1511 - 0.0000i 0.2321 - 0.0000i 0.4056 - 0.0000i 0.5095 - 0.0000i]
AP44 = [0.0287 - 0.0000i 0.1053 - 0.0000i 0.0436 - 0.0000i 0.0248 - 0.0000i 0.1905 - 0.0000i 0.2398 - 0.0000i 0.1484 - 0.0000i 0.2315 - 0.0000i 0.4061 - 0.0000i 0.5115 - 0.0000i]
AP45 = [0.0318 - 0.0000i 0.1187 - 0.0000i 0.0396 - 0.0000i 0.0259 - 0.0000i 0.2398 - 0.0000i 0.2215 - 0.0000i 0.1459 - 0.0000i 0.2309 - 0.0000i 0.4066 - 0.0000i 0.5135 - 0.0000i]
AP46 = [0.0364 - 0.0000i 0.1338 - 0.0000i 0.0364 - 0.0000i 0.0273 - 0.0000i 0.3038 - 0.0000i 0.2055 - 0.0000i 0.1436 - 0.0000i 0.2304 - 0.0000i 0.4070 - 0.0000i 0.5153 - 0.0000i]
AP47 = [0.0434 - 0.0000i 0.1498 - 0.0000i 0.0339 - 0.0000i 0.0291 - 0.0000i 0.3846 - 0.0000i 0.1915 - 0.0000i 0.1413 - 0.0000i 0.2298 - 0.0000i 0.4075 - 0.0000i 0.5170 - 0.0000i]
AP48 = [0.0549 - 0.0000i 0.1649 - 0.0000i 0.0318 - 0.0000i 0.0313 - 0.0000i 0.4809 - 0.0000i 0.1793 - 0.0000i 0.1392 - 0.0000i 0.2292 - 0.0000i 0.4079 - 0.0000i 0.5186 - 0.0000i]
AP49 = [0.0745 - 0.0000i 0.1771 - 0.0000i 0.0301 - 0.0000i 0.0340 - 0.0000i 0.5838 - 0.0000i 0.1686 - 0.0000i 0.1372 - 0.0000i 0.2287 - 0.0000i 0.4083 - 0.0000i 0.5201 - 0.0000i]

AP50 = [0.1089 - 0.0000i 0.1843 - 0.0000i 0.0288 - 0.0000i 0.0373 - 0.0000i 0.6743 - 0.0000i 0.1591 - 0.0000i 0.1353 - 0.0000i 0.2282 - 0.0000i 0.4087 - 0.0000i 0.5215 - 0.0000i]
AP51 = [0.1637 - 0.0000i 0.1856 - 0.0000i 0.0278 - 0.0000i 0.0413 - 0.0000i 0.7285 - 0.0000i 0.1508 - 0.0000i 0.1336 - 0.0000i 0.2277 - 0.0000i 0.4091 - 0.0000i 0.5228 - 0.0000i]
AP52 = [0.2116 - 0.0000i 0.1811 - 0.0000i 0.0271 - 0.0000i 0.0462 - 0.0000i 0.7322 - 0.0000i 0.1434 - 0.0000i 0.1319 - 0.0000i 0.2272 - 0.0000i 0.4095 - 0.0000i 0.5240 - 0.0000i]
AP53 = [0.1892 - 0.0000i 0.1722 - 0.0000i 0.0266 - 0.0000i 0.0520 - 0.0000i 0.6910 - 0.0000i 0.1368 - 0.0000i 0.1303 - 0.0000i 0.2267 - 0.0000i 0.4099 - 0.0000i 0.5251 - 0.0000i]
AP54 = [0.1306 - 0.0000i 0.1608 - 0.0000i 0.0263 - 0.0000i 0.0592 - 0.0000i 0.6237 - 0.0000i 0.1308 - 0.0000i 0.1288 - 0.0000i 0.2262 - 0.0000i 0.4102 - 0.0000i 0.5261 - 0.0000i]
AP55 = [0.0880 - 0.0000i 0.1485 - 0.0000i 0.0262 - 0.0000i 0.0678 - 0.0000i 0.5489 - 0.0000i 0.1255 - 0.0000i 0.1273 - 0.0000i 0.2258 - 0.0000i 0.4105 - 0.0000i 0.5269 - 0.0000i]
AP56 = [0.0632 - 0.0000i 0.1363 - 0.0000i 0.0262 - 0.0000i 0.0783 - 0.0000i 0.4780 - 0.0000i 0.1208 - 0.0000i 0.1260 - 0.0000i 0.2253 - 0.0000i 0.4109 - 0.0000i 0.5277 - 0.0000i]
AP57 = [0.0488 - 0.0000i 0.1250 - 0.0000i 0.0265 - 0.0000i 0.0911 - 0.0000i 0.4160 - 0.0000i 0.1165 - 0.0000i 0.1247 - 0.0000i 0.2249 - 0.0000i 0.4112 - 0.0000i 0.5285 - 0.0000i]
AP58 = [0.0401 - 0.0000i 0.1148 - 0.0000i 0.0269 - 0.0000i 0.1069 - 0.0000i 0.3638 - 0.0000i 0.1126 - 0.0000i 0.1235 - 0.0000i 0.2245 - 0.0000i 0.4115 - 0.0000i 0.5291 - 0.0000i]
AP59 = [0.0345 - 0.0000i 0.1059 - 0.0000i 0.0275 - 0.0000i 0.1262 - 0.0000i 0.3206 - 0.0000i 0.1090 - 0.0000i 0.1223 - 0.0000i 0.2241 - 0.0000i 0.4118 - 0.0000i 0.5296 - 0.0000i]
AP60 = [0.0308 - 0.0000i 0.0980 - 0.0000i 0.0282 - 0.0000i 0.1501 - 0.0000i 0.2849 - 0.0000i 0.1058 - 0.0000i 0.1212 - 0.0000i 0.2237 - 0.0000i 0.4120 - 0.0000i 0.5301 - 0.0000i]
AP61 = [0.0282 - 0.0000i 0.0913 - 0.0000i 0.0291 - 0.0000i 0.1796 - 0.0000i 0.2555 - 0.0000i 0.1028 - 0.0000i 0.1202 - 0.0000i 0.2233 - 0.0000i 0.4123 - 0.0000i 0.5305 - 0.0000i]
AP62 = [0.0264 - 0.0000i 0.0855 - 0.0000i 0.0301 - 0.0000i 0.2162 - 0.0000i 0.2311 - 0.0000i 0.1001 - 0.0000i 0.1192 - 0.0000i 0.2230 - 0.0000i 0.4126 - 0.0000i 0.5308 - 0.0000i]
AP63 = [0.0251 - 0.0000i 0.0805 - 0.0000i 0.0313 - 0.0000i 0.2614 - 0.0000i 0.2107 - 0.0000i 0.0977 - 0.0000i 0.1183 - 0.0000i 0.2227 - 0.0000i 0.4128 - 0.0000i 0.5311 - 0.0000i]
AP64 = [0.0241 - 0.0000i 0.0762 - 0.0000i 0.0327 - 0.0000i 0.3168 - 0.0000i 0.1936 - 0.0000i 0.0954 - 0.0000i 0.1174 - 0.0000i 0.2223 - 0.0000i 0.4130 - 0.0000i 0.5313 - 0.0000i]
AP65 = [0.0234 - 0.0000i 0.0725 - 0.0000i 0.0342 - 0.0000i 0.3841 - 0.0000i 0.1791 - 0.0000i 0.0934 - 0.0000i 0.1166 - 0.0000i 0.2220 - 0.0000i 0.4132 - 0.0000i 0.5315 - 0.0000i]
AP66 = [0.0229 - 0.0000i 0.0693 - 0.0000i 0.0359 - 0.0000i 0.4639 - 0.0000i 0.1667 - 0.0000i 0.0914 - 0.0000i 0.1158 - 0.0000i 0.2217 - 0.0000i 0.4135 - 0.0000i 0.5316 - 0.0000i]
AP67 = [0.0226 - 0.0000i 0.0666 - 0.0000i 0.0377 - 0.0000i 0.5554 - 0.0000i 0.1561 - 0.0000i 0.0897 - 0.0000i 0.1151 - 0.0000i 0.2215 - 0.0000i 0.4137 - 0.0000i 0.5317 - 0.0000i]
AP68 = [0.0223 - 0.0000i 0.0642 - 0.0000i 0.0398 - 0.0000i 0.6549 - 0.0000i 0.1470 - 0.0000i 0.0881 - 0.0000i 0.1144 - 0.0000i 0.2212 - 0.0000i 0.4138 - 0.0000i 0.5317 - 0.0000i]
AP69 = [0.0222 - 0.0000i 0.0622 - 0.0000i 0.0420 - 0.0000i 0.7548 - 0.0000i 0.1391 - 0.0000i 0.0866 - 0.0000i 0.1138 - 0.0000i 0.2209 - 0.0000i 0.4140 - 0.0000i 0.5317 - 0.0000i]
AP70 = [0.0221 - 0.0000i 0.0605 - 0.0000i 0.0443 - 0.0000i 0.8445 - 0.0000i 0.1321 - 0.0000i 0.0852 - 0.0000i 0.1131 - 0.0000i 0.2207 - 0.0000i 0.4142 - 0.0000i 0.5317 - 0.0000i]
AP71 = [0.0220 - 0.0000i 0.0590 - 0.0000i 0.0468 - 0.0000i 0.9123 - 0.0000i 0.1261 - 0.0000i 0.0840 - 0.0000i 0.1126 - 0.0000i 0.2205 - 0.0000i 0.4144 - 0.0000i 0.5316 - 0.0000i]
AP72 = [0.0221 - 0.0000i 0.0577 - 0.0000i 0.0495 - 0.0000i 0.9500 - 0.0000i 0.1208 - 0.0000i 0.0828 - 0.0000i 0.1120 - 0.0000i 0.2203 - 0.0000i 0.4145 - 0.0000i 0.5316 - 0.0000i]
AP73 = [0.0221 - 0.0000i 0.0567 - 0.0000i 0.0523 - 0.0000i 0.9559 - 0.0000i 0.1161 - 0.0000i 0.0817 - 0.0000i 0.1115 - 0.0000i 0.2201 - 0.0000i 0.4147 - 0.0000i 0.5315 - 0.0000i]
AP74 = [0.0222 - 0.0000i 0.0557 - 0.0000i 0.0553 - 0.0000i 0.9346 - 0.0000i 0.1120 - 0.0000i 0.0808 - 0.0000i 0.1111 - 0.0000i 0.2199 - 0.0000i 0.4148 - 0.0000i 0.5314 - 0.0000i]

AP75 = [0.0223 - 0.0000i   0.0550 - 0.0000i   0.0583 - 0.0000i   0.8944 - 0.0000i   0.1083 - 0.0000i   0.0799 - 0.0000i   0.1106 - 0.0000i   0.2197 - 0.0000i 0.4149 - 0.0000i   0.5313 - 0.0000i]
AP76 = [0.0224 - 0.0000i   0.0543 - 0.0000i   0.0615 - 0.0000i   0.8439 - 0.0000i   0.1051 - 0.0000i   0.0791 - 0.0000i   0.1102 - 0.0000i   0.2196 - 0.0000i 0.4150 - 0.0000i   0.5311 - 0.0000i]
AP77 = [0.0225 - 0.0000i   0.0538 - 0.0000i   0.0647 - 0.0000i   0.7901 - 0.0000i   0.1022 - 0.0000i   0.0783 - 0.0000i   0.1099 - 0.0000i   0.2194 - 0.0000i 0.4151 - 0.0000i   0.5310 - 0.0000i]
AP78 = [0.0226 - 0.0000i   0.0533 - 0.0000i   0.0679 - 0.0000i   0.7376 - 0.0000i   0.0997 - 0.0000i   0.0776 - 0.0000i   0.1095 - 0.0000i   0.2193 - 0.0000i 0.4152 - 0.0000i   0.5309 - 0.0000i]
AP79 = [0.0228 - 0.0000i   0.0529 - 0.0000i   0.0711 - 0.0000i   0.6889 - 0.0000i   0.0975 - 0.0000i   0.0770 - 0.0000i   0.1092 - 0.0000i   0.2191 - 0.0000i 0.4153 - 0.0000i   0.5308 - 0.0000i]
AP80 = [0.0229 - 0.0000i   0.0526 - 0.0000i   0.0743 - 0.0000i   0.6453 - 0.0000i   0.0955 - 0.0000i   0.0765 - 0.0000i   0.1090 - 0.0000i   0.2190 - 0.0000i 0.4154 - 0.0000i   0.5306 - 0.0000i]
AP81 = [0.0230 - 0.0000i   0.0524 - 0.0000i   0.0774 - 0.0000i   0.6073 - 0.0000i   0.0938 - 0.0000i   0.0760 - 0.0000i   0.1087 - 0.0000i   0.2189 - 0.0000i 0.4155 - 0.0000i   0.5305 - 0.0000i]
AP82 = [0.0232 - 0.0000i   0.0522 - 0.0000i   0.0803 - 0.0000i   0.5747 - 0.0000i   0.0923 - 0.0000i   0.0756 - 0.0000i   0.1085 - 0.0000i   0.2188 - 0.0000i 0.4156 - 0.0000i   0.5304 - 0.0000i]
AP83 = [0.0233 - 0.0000i   0.0520 - 0.0000i   0.0830 - 0.0000i   0.5471 - 0.0000i   0.0910 - 0.0000i   0.0752 - 0.0000i   0.1083 - 0.0000i   0.2187 - 0.0000i 0.4156 - 0.0000i   0.5303 - 0.0000i]
AP84 = [0.0234 - 0.0000i   0.0519 - 0.0000i   0.0855 - 0.0000i   0.5242 - 0.0000i   0.0900 - 0.0000i   0.0749 - 0.0000i   0.1081 - 0.0000i   0.2187 - 0.0000i 0.4157 - 0.0000i   0.5302 - 0.0000i]
AP85 = [0.0235 - 0.0000i   0.0518 - 0.0000i   0.0877 - 0.0000i   0.5056 - 0.0000i   0.0891 - 0.0000i   0.0746 - 0.0000i   0.1080 - 0.0000i   0.2186 - 0.0000i 0.4157 - 0.0000i   0.5301 - 0.0000i]
AP86 = [0.0236 - 0.0000i   0.0518 - 0.0000i   0.0896 - 0.0000i   0.4909 - 0.0000i   0.0883 - 0.0000i   0.0744 - 0.0000i   0.1079 - 0.0000i   0.2186 - 0.0000i 0.4157 - 0.0000i   0.5301 - 0.0000i]
AP87 = [0.0236 - 0.0000i   0.0517 - 0.0000i   0.0911 - 0.0000i   0.4798 - 0.0000i   0.0878 - 0.0000i   0.0742 - 0.0000i   0.1078 - 0.0000i   0.2185 - 0.0000i 0.4158 - 0.0000i   0.5300 - 0.0000i]
AP88 = [0.0237 - 0.0000i   0.0517 - 0.0000i   0.0922 - 0.0000i   0.4720 - 0.0000i   0.0874 - 0.0000i   0.0741 - 0.0000i   0.1077 - 0.0000i   0.2185 - 0.0000i 0.4158 - 0.0000i   0.5300 - 0.0000i]
AP89 = [0.0237 - 0.0000i   0.0517 - 0.0000i   0.0928 - 0.0000i   0.4674 - 0.0000i   0.0872 - 0.0000i   0.0740 - 0.0000i   0.1077 - 0.0000i   0.2185 - 0.0000i 0.4158 - 0.0000i   0.5300 - 0.0000i]

p-polarization

RP1 = [0.9287   0.8465   0.9338   0.8740   0.9668   0.9520   0.7168   0.7490   0.6145   0.5801]
RP2 = [0.9291   0.8468   0.9335   0.8749   0.9668   0.9516   0.7168   0.7489   0.6145   0.5799]
RP3 = [0.9299   0.8473   0.9329   0.8762   0.9668   0.9509   0.7167   0.7489   0.6144   0.5795]
RP4 = [0.9310   0.8480   0.9321   0.8781   0.9669   0.9499   0.7167   0.7489   0.6142   0.5789]
RP5 = [0.9323   0.8489   0.9311   0.8804   0.9669   0.9486   0.7166   0.7489   0.6140   0.5781]
RP6 = [0.9338   0.8500   0.9298   0.8832   0.9670   0.9469   0.7167   0.7488   0.6137   0.5772]
RP7 = [0.9356   0.8513   0.9281   0.8863   0.9670   0.9449   0.7168   0.7488   0.6134   0.5761]
RP8 = [0.9375   0.8529   0.9262   0.8897   0.9671   0.9424   0.7170   0.7488   0.6131   0.5748]
RP9 = [0.9396   0.8548   0.9239   0.8934   0.9671   0.9395   0.7174   0.7487   0.6127   0.5734]
RP10 = [0.9418   0.8569   0.9211   0.8973   0.9672   0.9360   0.7179   0.7487   0.6123   0.5718]
RP11 = [0.9440   0.8593   0.9178   0.9013   0.9672   0.9320   0.7186   0.7486   0.6118   0.5701]
RP12 = [0.9463   0.8619   0.9140   0.9053   0.9672   0.9273   0.7196   0.7486   0.6113   0.5682]
RP13 = [0.9486   0.8649   0.9095   0.9094   0.9672   0.9218   0.7207   0.7486   0.6108   0.5661]
RP14 = [0.9509   0.8681   0.9041   0.9135   0.9671   0.9154   0.7222   0.7485   0.6102   0.5639]
RP15 = [0.9531   0.8715   0.8978   0.9175   0.9670   0.9079   0.7238   0.7485   0.6095   0.5615]
RP16 = [0.9553   0.8752   0.8903   0.9214   0.9668   0.8993   0.7258   0.7485   0.6089   0.5590]
RP17 = [0.9574   0.8791   0.8813   0.9252   0.9666   0.8894   0.7279   0.7484   0.6082   0.5563]

RP18 = [0.9594 0.8832 0.8706 0.9289 0.9662 0.8779 0.7303 0.7484 0.6075 0.5535]
RP19 = [0.9613 0.8874 0.8577 0.9324 0.9658 0.8646 0.7330 0.7484 0.6067 0.5506]
RP20 = [0.9631 0.8917 0.8420 0.9357 0.9653 0.8493 0.7358 0.7484 0.6059 0.5475]
RP21 = [0.9648 0.8960 0.8229 0.9388 0.9647 0.8317 0.7389 0.7484 0.6051 0.5442]
RP22 = [0.9664 0.9004 0.7995 0.9417 0.9639 0.8116 0.7421 0.7485 0.6043 0.5409]
RP23 = [0.9678 0.9046 0.7707 0.9445 0.9630 0.7889 0.7454 0.7485 0.6034 0.5374]
RP24 = [0.9691 0.9088 0.7354 0.9470 0.9619 0.7633 0.7489 0.7486 0.6026 0.5338]
RP25 = [0.9703 0.9129 0.6923 0.9494 0.9606 0.7349 0.7525 0.7486 0.6017 0.5301]
RP26 = [0.9714 0.9167 0.6407 0.9515 0.9590 0.7038 0.7562 0.7487 0.6007 0.5263]
RP27 = [0.9724 0.9203 0.5814 0.9535 0.9572 0.6707 0.7600 0.7488 0.5998 0.5224]
RP28 = [0.9732 0.9237 0.5183 0.9553 0.9550 0.6362 0.7638 0.7489 0.5989 0.5184]
RP29 = [0.9740 0.9267 0.4597 0.9569 0.9525 0.6017 0.7676 0.7491 0.5979 0.5144]
RP30 = [0.9746 0.9295 0.4187 0.9583 0.9495 0.5687 0.7714 0.7492 0.5969 0.5102]
RP31 = [0.9751 0.9319 0.4083 0.9595 0.9461 0.5390 0.7752 0.7494 0.5960 0.5061]
RP32 = [0.9754 0.9340 0.4329 0.9606 0.9421 0.5145 0.7790 0.7496 0.5950 0.5019]
RP33 = [0.9756 0.9357 0.4852 0.9615 0.9373 0.4968 0.7828 0.7498 0.5940 0.4976]
RP34 = [0.9757 0.9370 0.5512 0.9623 0.9318 0.4868 0.7866 0.7500 0.5930 0.4934]
RP35 = [0.9756 0.9379 0.6183 0.9629 0.9253 0.4847 0.7903 0.7503 0.5920 0.4892]
RP36 = [0.9753 0.9384 0.6789 0.9633 0.9177 0.4901 0.7939 0.7506 0.5910 0.4850]
RP37 = [0.9748 0.9385 0.7303 0.9635 0.9087 0.5020 0.7974 0.7509 0.5901 0.4809]
RP38 = [0.9741 0.9381 0.7724 0.9636 0.8980 0.5189 0.8009 0.7512 0.5891 0.4768]
RP39 = [0.9730 0.9373 0.8065 0.9635 0.8853 0.5394 0.8043 0.7515 0.5882 0.4728]
RP40 = [0.9716 0.9360 0.8338 0.9632 0.8701 0.5622 0.8076 0.7519 0.5872 0.4689]
RP41 = [0.9697 0.9341 0.8558 0.9627 0.8518 0.5860 0.8109 0.7522 0.5863 0.4652]
RP42 = [0.9671 0.9318 0.8736 0.9620 0.8297 0.6101 0.8140 0.7526 0.5854 0.4617]
RP43 = [0.9638 0.9288 0.8880 0.9611 0.8029 0.6337 0.8170 0.7531 0.5845 0.4583]
RP44 = [0.9593 0.9251 0.8999 0.9600 0.7703 0.6564 0.8199 0.7535 0.5836 0.4552]
RP45 = [0.9533 0.9207 0.9096 0.9585 0.7303 0.6779 0.8226 0.7539 0.5828 0.4524]
RP46 = [0.9452 0.9154 0.9176 0.9568 0.6814 0.6982 0.8253 0.7544 0.5820 0.4499]
RP47 = [0.9342 0.9093 0.9243 0.9548 0.6216 0.7170 0.8278 0.7549 0.5812 0.4477]
RP48 = [0.9189 0.9021 0.9299 0.9523 0.5496 0.7345 0.8302 0.7554 0.5804 0.4458]
RP49 = [0.8976 0.8937 0.9346 0.9494 0.4646 0.7505 0.8324 0.7559 0.5797 0.4444]
RP50 = [0.8687 0.8841 0.9385 0.9460 0.3687 0.7653 0.8345 0.7564 0.5790 0.4435]
RP51 = [0.8313 0.8730 0.9417 0.9420 0.2687 0.7788 0.8364 0.7570 0.5784 0.4430]
RP52 = [0.7894 0.8604 0.9444 0.9372 0.1777 0.7910 0.8382 0.7576 0.5778 0.4431]
RP53 = [0.7556 0.8461 0.9466 0.9315 0.1142 0.8020 0.8399 0.7581 0.5773 0.4437]
RP54 = [0.7462 0.8302 0.9484 0.9246 0.0952 0.8118 0.8413 0.7587 0.5769 0.4449]
RP55 = [0.7651 0.8128 0.9498 0.9162 0.1262 0.8203 0.8427 0.7593 0.5765 0.4467]
RP56 = [0.7994 0.7944 0.9508 0.9060 0.1978 0.8276 0.8439 0.7599 0.5761 0.4492]
RP57 = [0.8348 0.7756 0.9514 0.8934 0.2917 0.8336 0.8449 0.7605 0.5758 0.4522]
RP58 = [0.8647 0.7576 0.9517 0.8774 0.3906 0.8381 0.8458 0.7611 0.5756 0.4559]
RP59 = [0.8879 0.7417 0.9517 0.8570 0.4830 0.8412 0.8466 0.7617 0.5755 0.4603]
RP60 = [0.9054 0.7298 0.9513 0.8303 0.5637 0.8426 0.8472 0.7623 0.5755 0.4652]
RP61 = [0.9184 0.7232 0.9505 0.7946 0.6313 0.8423 0.8477 0.7629 0.5755 0.4707]
RP62 = [0.9282 0.7232 0.9492 0.7457 0.6869 0.8402 0.8481 0.7635 0.5756 0.4768]
RP63 = [0.9355 0.7297 0.9474 0.6776 0.7319 0.8362 0.8485 0.7641 0.5759 0.4833]
RP64 = [0.9411 0.7421 0.9449 0.5813 0.7681 0.8303 0.8487 0.7646 0.5762 0.4903]
RP65 = [0.9451 0.7587 0.9416 0.4469 0.7970 0.8227 0.8489 0.7652 0.5766 0.4976]
RP66 = [0.9481 0.7776 0.9373 0.2736 0.8199 0.8136 0.8490 0.7657 0.5770 0.5051]
RP67 = [0.9501 0.7973 0.9317 0.0978 0.8377 0.8034 0.8490 0.7663 0.5776 0.5129]
RP68 = [0.9512 0.8164 0.9243 0.0145 0.8515 0.7924 0.8490 0.7668 0.5782 0.5207]

RP69 = [0.9515 0.8340 0.9146 0.0931 0.8616 0.7812 0.8490 0.7673 0.5789 0.5285]
RP70 = [0.9510 0.8495 0.9015 0.2711 0.8688 0.7702 0.8489 0.7677 0.5797 0.5363]
RP71 = [0.9495 0.8629 0.8839 0.4486 0.8734 0.7599 0.8488 0.7682 0.5806 0.5438]
RP72 = [0.9470 0.8741 0.8598 0.5848 0.8757 0.7507 0.8488 0.7686 0.5814 0.5512]
RP73 = [0.9431 0.8832 0.8264 0.6804 0.8760 0.7427 0.8487 0.7689 0.5824 0.5583]
RP74 = [0.9375 0.8903 0.7800 0.7462 0.8745 0.7360 0.8485 0.7693 0.5833 0.5650]
RP75 = [0.9297 0.8957 0.7157 0.7917 0.8716 0.7307 0.8484 0.7696 0.5843 0.5714]
RP76 = [0.9187 0.8996 0.6293 0.8237 0.8673 0.7265 0.8483 0.7699 0.5852 0.5773]
RP77 = [0.9036 0.9021 0.5207 0.8467 0.8620 0.7235 0.8482 0.7702 0.5862 0.5828]
RP78 = [0.8827 0.9035 0.4026 0.8634 0.8558 0.7214 0.8481 0.7705 0.5871 0.5878]
RP79 = [0.8542 0.9040 0.3045 0.8757 0.8489 0.7201 0.8480 0.7707 0.5880 0.5924]
RP80 = [0.8161 0.9036 0.2585 0.8849 0.8417 0.7193 0.8480 0.7709 0.5888 0.5966]
RP81 = [0.7676 0.9027 0.2720 0.8918 0.8342 0.7191 0.8479 0.7711 0.5896 0.6003]
RP82 = [0.7104 0.9013 0.3246 0.8970 0.8267 0.7191 0.8478 0.7712 0.5903 0.6035]
RP83 = [0.6513 0.8997 0.3900 0.9009 0.8195 0.7193 0.8478 0.7714 0.5910 0.6063]
RP84 = [0.6006 0.8980 0.4517 0.9039 0.8128 0.7197 0.8477 0.7715 0.5916 0.6087]
RP85 = [0.5670 0.8963 0.5030 0.9062 0.8067 0.7201 0.8477 0.7716 0.5921 0.6108]
RP86 = [0.5523 0.8947 0.5428 0.9078 0.8015 0.7205 0.8477 0.7717 0.5925 0.6124]
RP87 = [0.5510 0.8934 0.5719 0.9090 0.7973 0.7209 0.8476 0.7717 0.5928 0.6136]
RP88 = [0.5559 0.8923 0.5916 0.9098 0.7941 0.7211 0.8476 0.7718 0.5930 0.6145]
RP89 = [0.5610 0.8917 0.6030 0.9102 0.7922 0.7213 0.8476 0.7718 0.5932 0.6150]

AP1 = [0.0713 - 0.0000i 0.1535 - 0.0000i 0.0662 - 0.0000i 0.1260 - 0.0000i 0.0332 - 0.0000i 0.0480 - 0.0000i 0.2832 - 0.0000i 0.2510 - 0.0000i 0.3855 - 0.0000i 0.4199 - 0.0000i]
AP2 = [0.0709 - 0.0000i 0.1532 - 0.0000i 0.0665 - 0.0000i 0.1251 - 0.0000i 0.0332 - 0.0000i 0.0484 - 0.0000i 0.2832 - 0.0000i 0.2511 - 0.0000i 0.3855 - 0.0000i 0.4201 - 0.0000i]
AP3 = [0.0701 - 0.0000i 0.1527 - 0.0000i 0.0671 - 0.0000i 0.1238 - 0.0000i 0.0332 - 0.0000i 0.0491 - 0.0000i 0.2833 - 0.0000i 0.2511 - 0.0000i 0.3856 - 0.0000i 0.4205 - 0.0000i]
AP4 = [0.0690 - 0.0000i 0.1520 - 0.0000i 0.0679 - 0.0000i 0.1219 - 0.0000i 0.0331 - 0.0000i 0.0501 - 0.0000i 0.2833 - 0.0000i 0.2511 - 0.0000i 0.3858 - 0.0000i 0.4211 - 0.0000i]
AP5 = [0.0677 - 0.0000i 0.1511 - 0.0000i 0.0689 - 0.0000i 0.1196 - 0.0000i 0.0331 - 0.0000i 0.0514 - 0.0000i 0.2834 - 0.0000i 0.2511 - 0.0000i 0.3860 - 0.0000i 0.4219 - 0.0000i]
AP6 = [0.0662 - 0.0000i 0.1500 - 0.0000i 0.0702 - 0.0000i 0.1168 - 0.0000i 0.0330 - 0.0000i 0.0531 - 0.0000i 0.2833 - 0.0000i 0.2512 - 0.0000i 0.3863 - 0.0000i 0.4228 - 0.0000i]
AP7 = [0.0644 - 0.0000i 0.1487 - 0.0000i 0.0719 - 0.0000i 0.1137 - 0.0000i 0.0330 - 0.0000i 0.0551 - 0.0000i 0.2832 - 0.0000i 0.2512 - 0.0000i 0.3866 - 0.0000i 0.4239 - 0.0000i]
AP8 = [0.0625 - 0.0000i 0.1471 - 0.0000i 0.0738 - 0.0000i 0.1103 - 0.0000i 0.0329 - 0.0000i 0.0576 - 0.0000i 0.2830 - 0.0000i 0.2512 - 0.0000i 0.3869 - 0.0000i 0.4252 - 0.0000i]
AP9 = [0.0604 - 0.0000i 0.1452 - 0.0000i 0.0761 - 0.0000i 0.1066 - 0.0000i 0.0329 - 0.0000i 0.0605 - 0.0000i 0.2826 - 0.0000i 0.2513 - 0.0000i 0.3873 - 0.0000i 0.4266 - 0.0000i]
AP10 = [0.0582 - 0.0000i 0.1431 - 0.0000i 0.0789 - 0.0000i 0.1027 - 0.0000i 0.0328 - 0.0000i 0.0640 - 0.0000i 0.2821 - 0.0000i 0.2513 - 0.0000i 0.3877 - 0.0000i 0.4282 - 0.0000i]
AP11 = [0.0560 - 0.0000i 0.1407 - 0.0000i 0.0822 - 0.0000i 0.0987 - 0.0000i 0.0328 - 0.0000i 0.0680 - 0.0000i 0.2814 - 0.0000i 0.2514 - 0.0000i 0.3882 - 0.0000i 0.4299 - 0.0000i]
AP12 = [0.0537 - 0.0000i 0.1381 - 0.0000i 0.0860 - 0.0000i 0.0947 - 0.0000i 0.0328 - 0.0000i 0.0727 - 0.0000i 0.2804 - 0.0000i 0.2514 - 0.0000i 0.3887 - 0.0000i 0.4318 - 0.0000i]
AP13 = [0.0514 - 0.0000i 0.1351 - 0.0000i 0.0905 - 0.0000i 0.0906 - 0.0000i 0.0328 - 0.0000i 0.0782 - 0.0000i 0.2793 - 0.0000i 0.2514 - 0.0000i 0.3892 - 0.0000i 0.4339 - 0.0000i]
AP14 = [0.0491 - 0.0000i 0.1319 - 0.0000i 0.0959 - 0.0000i 0.0865 - 0.0000i 0.0329 - 0.0000i 0.0846

- 0.0000i 0.2778 - 0.0000i 0.2515 - 0.0000i 0.3898 - 0.0000i 0.4361 - 0.0000i]
AP15 = [0.0469 - 0.0000i 0.1285 - 0.0000i 0.1022 - 0.0000i 0.0825 - 0.0000i 0.0330 - 0.0000i 0.0921 - 0.0000i 0.2762 - 0.0000i 0.2515 - 0.0000i 0.3905 - 0.0000i 0.4385 - 0.0000i]
AP16 = [0.0447 - 0.0000i 0.1248 - 0.0000i 0.1097 - 0.0000i 0.0786 - 0.0000i 0.0332 - 0.0000i 0.1007 - 0.0000i 0.2742 - 0.0000i 0.2515 - 0.0000i 0.3911 - 0.0000i 0.4410 - 0.0000i]
AP17 = [0.0426 - 0.0000i 0.1209 - 0.0000i 0.1187 - 0.0000i 0.0748 - 0.0000i 0.0334 - 0.0000i 0.1106 - 0.0000i 0.2721 - 0.0000i 0.2516 - 0.0000i 0.3918 - 0.0000i 0.4437 - 0.0000i]
AP18 = [0.0406 - 0.0000i 0.1168 - 0.0000i 0.1294 - 0.0000i 0.0711 - 0.0000i 0.0338 - 0.0000i 0.1221 - 0.0000i 0.2697 - 0.0000i 0.2516 - 0.0000i 0.3925 - 0.0000i 0.4465 - 0.0000i]
AP19 = [0.0387 - 0.0000i 0.1126 - 0.0000i 0.1423 - 0.0000i 0.0676 - 0.0000i 0.0342 - 0.0000i 0.1354 - 0.0000i 0.2670 - 0.0000i 0.2516 - 0.0000i 0.3933 - 0.0000i 0.4494 - 0.0000i]
AP20 = [0.0369 - 0.0000i 0.1083 - 0.0000i 0.1580 - 0.0000i 0.0643 - 0.0000i 0.0347 - 0.0000i 0.1507 - 0.0000i 0.2642 - 0.0000i 0.2516 - 0.0000i 0.3941 - 0.0000i 0.4525 - 0.0000i]
AP21 = [0.0352 - 0.0000i 0.1040 - 0.0000i 0.1771 - 0.0000i 0.0612 - 0.0000i 0.0353 - 0.0000i 0.1683 - 0.0000i 0.2611 - 0.0000i 0.2516 - 0.0000i 0.3949 - 0.0000i 0.4558 - 0.0000i]
AP22 = [0.0336 - 0.0000i 0.0996 - 0.0000i 0.2005 - 0.0000i 0.0583 - 0.0000i 0.0361 - 0.0000i 0.1884 - 0.0000i 0.2579 - 0.0000i 0.2515 - 0.0000i 0.3957 - 0.0000i 0.4591 - 0.0000i]
AP23 = [0.0322 - 0.0000i 0.0954 - 0.0000i 0.2293 - 0.0000i 0.0555 - 0.0000i 0.0370 - 0.0000i 0.2111 - 0.0000i 0.2546 - 0.0000i 0.2515 - 0.0000i 0.3966 - 0.0000i 0.4626 - 0.0000i]
AP24 = [0.0309 - 0.0000i 0.0912 - 0.0000i 0.2646 - 0.0000i 0.0530 - 0.0000i 0.0381 - 0.0000i 0.2367 - 0.0000i 0.2511 - 0.0000i 0.2514 - 0.0000i 0.3974 - 0.0000i 0.4662 - 0.0000i]
AP25 = [0.0297 - 0.0000i 0.0871 - 0.0000i 0.3077 - 0.0000i 0.0506 - 0.0000i 0.0394 - 0.0000i 0.2651 - 0.0000i 0.2475 - 0.0000i 0.2514 - 0.0000i 0.3983 - 0.0000i 0.4699 - 0.0000i]
AP26 = [0.0286 - 0.0000i 0.0833 - 0.0000i 0.3593 - 0.0000i 0.0485 - 0.0000i 0.0410 - 0.0000i 0.2962 - 0.0000i 0.2438 - 0.0000i 0.2513 - 0.0000i 0.3993 - 0.0000i 0.4737 - 0.0000i]
AP27 = [0.0276 - 0.0000i 0.0797 - 0.0000i 0.4186 - 0.0000i 0.0465 - 0.0000i 0.0428 - 0.0000i 0.3293 - 0.0000i 0.2400 - 0.0000i 0.2512 - 0.0000i 0.4002 - 0.0000i 0.4776 - 0.0000i]
AP28 = [0.0268 - 0.0000i 0.0763 - 0.0000i 0.4817 - 0.0000i 0.0447 - 0.0000i 0.0450 - 0.0000i 0.3638 - 0.0000i 0.2362 - 0.0000i 0.2511 - 0.0000i 0.4011 - 0.0000i 0.4816 - 0.0000i]
AP29 = [0.0260 - 0.0000i 0.0733 - 0.0000i 0.5403 - 0.0000i 0.0431 - 0.0000i 0.0475 - 0.0000i 0.3983 - 0.0000i 0.2324 - 0.0000i 0.2509 - 0.0000i 0.4021 - 0.0000i 0.4856 - 0.0000i]
AP30 = [0.0254 - 0.0000i 0.0705 - 0.0000i 0.5813 - 0.0000i 0.0417 - 0.0000i 0.0505 - 0.0000i 0.4313 - 0.0000i 0.2286 - 0.0000i 0.2508 - 0.0000i 0.4031 - 0.0000i 0.4898 - 0.0000i]
AP31 = [0.0249 - 0.0000i 0.0681 - 0.0000i 0.5917 - 0.0000i 0.0405 - 0.0000i 0.0539 - 0.0000i 0.4610 - 0.0000i 0.2248 - 0.0000i 0.2506 - 0.0000i 0.4040 - 0.0000i 0.4939 - 0.0000i]
AP32 = [0.0246 - 0.0000i 0.0660 - 0.0000i 0.5671 - 0.0000i 0.0394 - 0.0000i 0.0579 - 0.0000i 0.4855 - 0.0000i 0.2210 - 0.0000i 0.2504 - 0.0000i 0.4050 - 0.0000i 0.4981 - 0.0000i]
AP33 = [0.0244 - 0.0000i 0.0643 - 0.0000i 0.5148 - 0.0000i 0.0385 - 0.0000i 0.0627 - 0.0000i 0.5032 - 0.0000i 0.2172 - 0.0000i 0.2502 - 0.0000i 0.4060 - 0.0000i 0.5024 - 0.0000i]
AP34 = [0.0243 - 0.0000i 0.0630 - 0.0000i 0.4488 - 0.0000i 0.0377 - 0.0000i 0.0682 - 0.0000i 0.5132 - 0.0000i 0.2134 - 0.0000i 0.2500 - 0.0000i 0.4070 - 0.0000i 0.5066 - 0.0000i]
AP35 = [0.0244 - 0.0000i 0.0621 - 0.0000i 0.3817 - 0.0000i 0.0371 - 0.0000i 0.0747 - 0.0000i 0.5153 - 0.0000i 0.2097 - 0.0000i 0.2497 - 0.0000i 0.4080 - 0.0000i 0.5108 - 0.0000i]
AP36 = [0.0247 - 0.0000i 0.0616 - 0.0000i 0.3211 - 0.0000i 0.0367 - 0.0000i 0.0823 - 0.0000i 0.5099 - 0.0000i 0.2061 - 0.0000i 0.2494 - 0.0000i 0.4090 - 0.0000i 0.5150 - 0.0000i]
AP37 = [0.0252 - 0.0000i 0.0615 - 0.0000i 0.2697 - 0.0000i 0.0365 - 0.0000i 0.0913 - 0.0000i 0.4980 - 0.0000i 0.2026 - 0.0000i 0.2491 - 0.0000i 0.4099 - 0.0000i 0.5191 - 0.0000i]

AP38 = [0.0259 - 0.0000i 0.0619 - 0.0000i 0.2276 - 0.0000i 0.0364 - 0.0000i 0.1020 - 0.0000i 0.4811 - 0.0000i 0.1991 - 0.0000i 0.2488 - 0.0000i 0.4109 - 0.0000i 0.5232 - 0.0000i]
AP39 = [0.0270 - 0.0000i 0.0627 - 0.0000i 0.1935 - 0.0000i 0.0365 - 0.0000i 0.1147 - 0.0000i 0.4606 - 0.0000i 0.1957 - 0.0000i 0.2485 - 0.0000i 0.4118 - 0.0000i 0.5272 - 0.0000i]
AP40 = [0.0284 - 0.0000i 0.0640 - 0.0000i 0.1662 - 0.0000i 0.0368 - 0.0000i 0.1299 - 0.0000i 0.4378 - 0.0000i 0.1924 - 0.0000i 0.2481 - 0.0000i 0.4128 - 0.0000i 0.5311 - 0.0000i]
AP41 = [0.0303 - 0.0000i 0.0659 - 0.0000i 0.1442 - 0.0000i 0.0373 - 0.0000i 0.1482 - 0.0000i 0.4140 - 0.0000i 0.1891 - 0.0000i 0.2478 - 0.0000i 0.4137 - 0.0000i 0.5348 - 0.0000i]
AP42 = [0.0329 - 0.0000i 0.0682 - 0.0000i 0.1264 - 0.0000i 0.0380 - 0.0000i 0.1703 - 0.0000i 0.3899 - 0.0000i 0.1860 - 0.0000i 0.2474 - 0.0000i 0.4146 - 0.0000i 0.5383 - 0.0000i]
AP43 = [0.0362 - 0.0000i 0.0712 - 0.0000i 0.1120 - 0.0000i 0.0389 - 0.0000i 0.1971 - 0.0000i 0.3663 - 0.0000i 0.1830 - 0.0000i 0.2469 - 0.0000i 0.4155 - 0.0000i 0.5417 - 0.0000i]
AP44 = [0.0407 - 0.0000i 0.0749 - 0.0000i 0.1001 - 0.0000i 0.0400 - 0.0000i 0.2297 - 0.0000i 0.3436 - 0.0000i 0.1801 - 0.0000i 0.2465 - 0.0000i 0.4164 - 0.0000i 0.5448 - 0.0000i]
AP45 = [0.0467 - 0.0000i 0.0793 - 0.0000i 0.0904 - 0.0000i 0.0415 - 0.0000i 0.2697 - 0.0000i 0.3221 - 0.0000i 0.1774 - 0.0000i 0.2461 - 0.0000i 0.4172 - 0.0000i 0.5476 - 0.0000i]
AP46 = [0.0548 - 0.0000i 0.0846 - 0.0000i 0.0824 - 0.0000i 0.0432 - 0.0000i 0.3186 - 0.0000i 0.3018 - 0.0000i 0.1747 - 0.0000i 0.2456 - 0.0000i 0.4180 - 0.0000i 0.5501 - 0.0000i]
AP47 = [0.0658 - 0.0000i 0.0907 - 0.0000i 0.0757 - 0.0000i 0.0452 - 0.0000i 0.3784 - 0.0000i 0.2830 - 0.0000i 0.1722 - 0.0000i 0.2451 - 0.0000i 0.4188 - 0.0000i 0.5523 - 0.0000i]
AP48 = [0.0811 - 0.0000i 0.0979 - 0.0000i 0.0701 - 0.0000i 0.0477 - 0.0000i 0.4504 - 0.0000i 0.2655 - 0.0000i 0.1698 - 0.0000i 0.2446 - 0.0000i 0.4196 - 0.0000i 0.5542 - 0.0000i]
AP49 = [0.1024 - 0.0000i 0.1063 - 0.0000i 0.0654 - 0.0000i 0.0506 - 0.0000i 0.5354 - 0.0000i 0.2495 - 0.0000i 0.1676 - 0.0000i 0.2441 - 0.0000i 0.4203 - 0.0000i 0.5556 - 0.0000i]
AP50 = [0.1313 - 0.0000i 0.1159 - 0.0000i 0.0615 - 0.0000i 0.0540 - 0.0000i 0.6313 - 0.0000i 0.2347 - 0.0000i 0.1655 - 0.0000i 0.2436 - 0.0000i 0.4210 - 0.0000i 0.5565 - 0.0000i]
AP51 = [0.1687 - 0.0000i 0.1270 - 0.0000i 0.0583 - 0.0000i 0.0580 - 0.0000i 0.7313 - 0.0000i 0.2212 - 0.0000i 0.1636 - 0.0000i 0.2430 - 0.0000i 0.4216 - 0.0000i 0.5570 - 0.0000i]
AP52 = [0.2106 - 0.0000i 0.1396 - 0.0000i 0.0556 - 0.0000i 0.0628 - 0.0000i 0.8223 - 0.0000i 0.2090 - 0.0000i 0.1618 - 0.0000i 0.2424 - 0.0000i 0.4222 - 0.0000i 0.5569 - 0.0000i]
AP53 = [0.2444 - 0.0000i 0.1539 - 0.0000i 0.0534 - 0.0000i 0.0685 - 0.0000i 0.8858 - 0.0000i 0.1980 - 0.0000i 0.1601 - 0.0000i 0.2419 - 0.0000i 0.4227 - 0.0000i 0.5563 - 0.0000i]
AP54 = [0.2538 - 0.0000i 0.1698 - 0.0000i 0.0516 - 0.0000i 0.0754 - 0.0000i 0.9048 - 0.0000i 0.1882 - 0.0000i 0.1587 - 0.0000i 0.2413 - 0.0000i 0.4231 - 0.0000i 0.5551 - 0.0000i]
AP55 = [0.2349 - 0.0000i 0.1872 - 0.0000i 0.0502 - 0.0000i 0.0838 - 0.0000i 0.8738 - 0.0000i 0.1797 - 0.0000i 0.1573 - 0.0000i 0.2407 - 0.0000i 0.4235 - 0.0000i 0.5533 - 0.0000i]
AP56 = [0.2006 - 0.0000i 0.2056 - 0.0000i 0.0492 - 0.0000i 0.0940 - 0.0000i 0.8022 - 0.0000i 0.1724 - 0.0000i 0.1561 - 0.0000i 0.2401 - 0.0000i 0.4239 - 0.0000i 0.5508 - 0.0000i]
AP57 = [0.1652 - 0.0000i 0.2244 - 0.0000i 0.0486 - 0.0000i 0.1066 - 0.0000i 0.7083 - 0.0000i 0.1664 - 0.0000i 0.1551 - 0.0000i 0.2395 - 0.0000i 0.4242 - 0.0000i 0.5478 - 0.0000i]
AP58 = [0.1353 - 0.0000i 0.2424 - 0.0000i 0.0483 - 0.0000i 0.1226 - 0.0000i 0.6094 - 0.0000i 0.1619 - 0.0000i 0.1542 - 0.0000i 0.2389 - 0.0000i 0.4244 - 0.0000i 0.5441 - 0.0000i]
AP59 = [0.1121 - 0.0000i 0.2583 - 0.0000i 0.0483 - 0.0000i 0.1430 - 0.0000i 0.5170 - 0.0000i 0.1588 - 0.0000i 0.1534 - 0.0000i 0.2383 - 0.0000i 0.4245 - 0.0000i 0.5397 - 0.0000i]
AP60 = [0.0946 - 0.0000i 0.2702 - 0.0000i 0.0487 - 0.0000i 0.1697 - 0.0000i 0.4363 - 0.0000i 0.1574 - 0.0000i 0.1528 - 0.0000i 0.2377 - 0.0000i 0.4245 - 0.0000i 0.5348 - 0.0000i]
AP61 = [0.0816 - 0.0000i 0.2768 - 0.0000i 0.0495 - 0.0000i 0.2054 - 0.0000i 0.3687 - 0.0000i 0.1577

- 0.0000i 0.1523 - 0.0000i 0.2371 - 0.0000i 0.4245 - 0.0000i 0.5293 - 0.0000i]
AP62 = [0.0718 - 0.0000i 0.2768 - 0.0000i 0.0508 - 0.0000i 0.2543 - 0.0000i 0.3131 - 0.0000i 0.1598 - 0.0000i 0.1519 - 0.0000i 0.2365 - 0.0000i 0.4244 - 0.0000i 0.5232 - 0.0000i]
AP63 = [0.0645 - 0.0000i 0.2703 - 0.0000i 0.0526 - 0.0000i 0.3224 - 0.0000i 0.2681 - 0.0000i 0.1638 - 0.0000i 0.1515 - 0.0000i 0.2359 - 0.0000i 0.4241 - 0.0000i 0.5167 - 0.0000i]
AP64 = [0.0589 - 0.0000i 0.2579 - 0.0000i 0.0551 - 0.0000i 0.4187 - 0.0000i 0.2319 - 0.0000i 0.1697 - 0.0000i 0.1513 - 0.0000i 0.2354 - 0.0000i 0.4238 - 0.0000i 0.5097 - 0.0000i]
AP65 = [0.0549 - 0.0000i 0.2413 - 0.0000i 0.0584 - 0.0000i 0.5531 - 0.0000i 0.2030 - 0.0000i 0.1773 - 0.0000i 0.1511 - 0.0000i 0.2348 - 0.0000i 0.4234 - 0.0000i 0.5024 - 0.0000i]
AP66 = [0.0519 - 0.0000i 0.2224 - 0.0000i 0.0627 - 0.0000i 0.7264 - 0.0000i 0.1801 - 0.0000i 0.1864 - 0.0000i 0.1510 - 0.0000i 0.2343 - 0.0000i 0.4230 - 0.0000i 0.4949 - 0.0000i]
AP67 = [0.0499 - 0.0000i 0.2027 - 0.0000i 0.0683 - 0.0000i 0.9022 - 0.0000i 0.1623 - 0.0000i 0.1966 - 0.0000i 0.1510 - 0.0000i 0.2337 - 0.0000i 0.4224 - 0.0000i 0.4871 - 0.0000i]
AP68 = [0.0488 - 0.0000i 0.1836 - 0.0000i 0.0757 - 0.0000i 0.9855 - 0.0000i 0.1485 - 0.0000i 0.2076 - 0.0000i 0.1510 - 0.0000i 0.2332 - 0.0000i 0.4218 - 0.0000i 0.4793 - 0.0000i]
AP69 = [0.0485 - 0.0000i 0.1660 - 0.0000i 0.0854 - 0.0000i 0.9069 - 0.0000i 0.1384 - 0.0000i 0.2188 - 0.0000i 0.1510 - 0.0000i 0.2327 - 0.0000i 0.4211 - 0.0000i 0.4715 - 0.0000i]
AP70 = [0.0490 - 0.0000i 0.1505 - 0.0000i 0.0985 - 0.0000i 0.7289 - 0.0000i 0.1312 - 0.0000i 0.2298 - 0.0000i 0.1511 - 0.0000i 0.2323 - 0.0000i 0.4203 - 0.0000i 0.4637 - 0.0000i]
AP71 = [0.0505 - 0.0000i 0.1371 - 0.0000i 0.1161 - 0.0000i 0.5514 - 0.0000i 0.1266 - 0.0000i 0.2401 - 0.0000i 0.1512 - 0.0000i 0.2318 - 0.0000i 0.4194 - 0.0000i 0.4562 - 0.0000i]
AP72 = [0.0530 - 0.0000i 0.1259 - 0.0000i 0.1402 - 0.0000i 0.4152 - 0.0000i 0.1243 - 0.0000i 0.2493 - 0.0000i 0.1512 - 0.0000i 0.2314 - 0.0000i 0.4186 - 0.0000i 0.4488 - 0.0000i]
AP73 = [0.0569 - 0.0000i 0.1168 - 0.0000i 0.1736 - 0.0000i 0.3196 - 0.0000i 0.1240 - 0.0000i 0.2573 - 0.0000i 0.1513 - 0.0000i 0.2311 - 0.0000i 0.4176 - 0.0000i 0.4417 - 0.0000i]
AP74 = [0.0625 - 0.0000i 0.1097 - 0.0000i 0.2200 - 0.0000i 0.2538 - 0.0000i 0.1255 - 0.0000i 0.2640 - 0.0000i 0.1515 - 0.0000i 0.2307 - 0.0000i 0.4167 - 0.0000i 0.4350 - 0.0000i]
AP75 = [0.0703 - 0.0000i 0.1043 - 0.0000i 0.2843 - 0.0000i 0.2083 - 0.0000i 0.1284 - 0.0000i 0.2693 - 0.0000i 0.1516 - 0.0000i 0.2304 - 0.0000i 0.4157 - 0.0000i 0.4286 - 0.0000i]
AP76 = [0.0813 - 0.0000i 0.1004 - 0.0000i 0.3707 - 0.0000i 0.1763 - 0.0000i 0.1327 - 0.0000i 0.2735 - 0.0000i 0.1517 - 0.0000i 0.2301 - 0.0000i 0.4148 - 0.0000i 0.4227 - 0.0000i]
AP77 = [0.0964 - 0.0000i 0.0979 - 0.0000i 0.4793 - 0.0000i 0.1533 - 0.0000i 0.1380 - 0.0000i 0.2765 - 0.0000i 0.1518 - 0.0000i 0.2298 - 0.0000i 0.4138 - 0.0000i 0.4172 - 0.0000i]
AP78 = [0.1173 - 0.0000i 0.0965 - 0.0000i 0.5974 - 0.0000i 0.1366 - 0.0000i 0.1442 - 0.0000i 0.2786 - 0.0000i 0.1519 - 0.0000i 0.2295 - 0.0000i 0.4129 - 0.0000i 0.4122 - 0.0000i]
AP79 = [0.1458 - 0.0000i 0.0960 - 0.0000i 0.6955 - 0.0000i 0.1243 - 0.0000i 0.1511 - 0.0000i 0.2799 - 0.0000i 0.1520 - 0.0000i 0.2293 - 0.0000i 0.4120 - 0.0000i 0.4076 - 0.0000i]
AP80 = [0.1839 - 0.0000i 0.0964 - 0.0000i 0.7415 - 0.0000i 0.1151 - 0.0000i 0.1583 - 0.0000i 0.2807 - 0.0000i 0.1520 - 0.0000i 0.2291 - 0.0000i 0.4112 - 0.0000i 0.4034 - 0.0000i]
AP81 = [0.2324 - 0.0000i 0.0973 - 0.0000i 0.7280 - 0.0000i 0.1082 - 0.0000i 0.1658 - 0.0000i 0.2809 - 0.0000i 0.1521 - 0.0000i 0.2289 - 0.0000i 0.4104 - 0.0000i 0.3997 - 0.0000i]
AP82 = [0.2896 - 0.0000i 0.0987 - 0.0000i 0.6754 - 0.0000i 0.1030 - 0.0000i 0.1733 - 0.0000i 0.2809 - 0.0000i 0.1522 - 0.0000i 0.2288 - 0.0000i 0.4097 - 0.0000i 0.3965 - 0.0000i]
AP83 = [0.3487 - 0.0000i 0.1003 - 0.0000i 0.6100 - 0.0000i 0.0991 - 0.0000i 0.1805 - 0.0000i 0.2807 - 0.0000i 0.1522 - 0.0000i 0.2286 - 0.0000i 0.4090 - 0.0000i 0.3937 - 0.0000i]
AP84 = [0.3994 - 0.0000i 0.1020 - 0.0000i 0.5483 - 0.0000i 0.0961 - 0.0000i 0.1872 - 0.0000i 0.2803 - 0.0000i 0.1523 - 0.0000i 0.2285 - 0.0000i 0.4084 - 0.0000i 0.3913 - 0.0000i]

AP85 = [0.4330 - 0.0000i 0.1037 - 0.0000i 0.4970 - 0.0000i 0.0938 - 0.0000i 0.1933 - 0.0000i 0.2799 - 0.0000i 0.1523 - 0.0000i 0.2284 - 0.0000i 0.4079 - 0.0000i 0.3892 - 0.0000i]
AP86 = [0.4477 - 0.0000i 0.1053 - 0.0000i 0.4572 - 0.0000i 0.0922 - 0.0000i 0.1985 - 0.0000i 0.2795 - 0.0000i 0.1523 - 0.0000i 0.2283 - 0.0000i 0.4075 - 0.0000i 0.3876 - 0.0000i]
AP87 = [0.4490 - 0.0000i 0.1066 - 0.0000i 0.4281 - 0.0000i 0.0910 - 0.0000i 0.2027 - 0.0000i 0.2791 - 0.0000i 0.1524 - 0.0000i 0.2283 - 0.0000i 0.4072 - 0.0000i 0.3864 - 0.0000i]
AP88 = [0.4441 - 0.0000i 0.1077 - 0.0000i 0.4084 - 0.0000i 0.0902 - 0.0000i 0.2059 - 0.0000i 0.2789 - 0.0000i 0.1524 - 0.0000i 0.2282 - 0.0000i 0.4070 - 0.0000i 0.3855 - 0.0000i]
AP89 = [0.4390 - 0.0000i 0.1083 - 0.0000i 0.3970 - 0.0000i 0.0898 - 0.0000i 0.2078 - 0.0000i 0.2787 - 0.0000i 0.1524 - 0.0000i 0.2282 - 0.0000i 0.4068 - 0.0000i 0.3850 - 0.0000i]

Simulation values of Matlab for Sensor Structure 1

Values for s – polarization

RP1 = [0.4259 0.1705 0.0888 0.2425 0.4415 0.4460 0.4298 0.3726 0.2470 0.2266]
RP2 = [0.4259 0.1705 0.0889 0.2426 0.4417 0.4460 0.4298 0.3727 0.2470 0.2267]
RP3 = [0.4258 0.1703 0.0891 0.2429 0.4418 0.4462 0.4299 0.3727 0.2471 0.2267]
RP4 = [0.4256 0.1702 0.0894 0.2433 0.4421 0.4463 0.4300 0.3728 0.2471 0.2268]
RP5 = [0.4254 0.1699 0.0897 0.2437 0.4424 0.4465 0.4301 0.3729 0.2472 0.2269]
RP6 = [0.4251 0.1697 0.0901 0.2443 0.4428 0.4468 0.4303 0.3730 0.2473 0.2270]
RP7 = [0.4248 0.1694 0.0907 0.2450 0.4433 0.4471 0.4305 0.3732 0.2474 0.2271]
RP8 = [0.4244 0.1690 0.0913 0.2458 0.4438 0.4474 0.4307 0.3733 0.2475 0.2273]
RP9 = [0.4240 0.1686 0.0919 0.2466 0.4445 0.4478 0.4310 0.3735 0.2476 0.2275]
RP10 = [0.4235 0.1682 0.0927 0.2476 0.4451 0.4483 0.4313 0.3738 0.2477 0.2277]
RP11 = [0.4230 0.1677 0.0935 0.2487 0.4459 0.4487 0.4316 0.3740 0.2479 0.2279]
RP12 = [0.4224 0.1672 0.0944 0.2499 0.4467 0.4493 0.4319 0.3743 0.2480 0.2281]
RP13 = [0.4218 0.1666 0.0954 0.2512 0.4476 0.4498 0.4323 0.3745 0.2482 0.2284]
RP14 = [0.4212 0.1660 0.0965 0.2525 0.4485 0.4504 0.4327 0.3748 0.2484 0.2286]
RP15 = [0.4205 0.1654 0.0977 0.2540 0.4495 0.4511 0.4331 0.3752 0.2486 0.2289]
RP16 = [0.4197 0.1648 0.0989 0.2555 0.4506 0.4517 0.4335 0.3755 0.2488 0.2292]
RP17 = [0.4189 0.1641 0.1002 0.2572 0.4517 0.4525 0.4340 0.3759 0.2491 0.2295]
RP18 = [0.4180 0.1635 0.1016 0.2589 0.4529 0.4532 0.4345 0.3762 0.2493 0.2299]
RP19 = [0.4171 0.1628 0.1031 0.2607 0.4542 0.4540 0.4350 0.3766 0.2496 0.2303]
RP20 = [0.4161 0.1621 0.1047 0.2626 0.4555 0.4549 0.4355 0.3771 0.2498 0.2306]
RP21 = [0.4151 0.1614 0.1064 0.2646 0.4568 0.4557 0.4361 0.3775 0.2501 0.2310]
RP22 = [0.4141 0.1606 0.1081 0.2667 0.4582 0.4566 0.4367 0.3779 0.2504 0.2314]
RP23 = [0.4130 0.1599 0.1099 0.2688 0.4596 0.4575 0.4373 0.3784 0.2507 0.2319]
RP24 = [0.4118 0.1592 0.1118 0.2710 0.4611 0.4585 0.4379 0.3789 0.2510 0.2323]
RP25 = [0.4106 0.1585 0.1138 0.2733 0.4627 0.4595 0.4385 0.3794 0.2514 0.2328]
RP26 = [0.4094 0.1578 0.1159 0.2756 0.4642 0.4605 0.4392 0.3799 0.2517 0.2333]
RP27 = [0.4081 0.1571 0.1180 0.2780 0.4658 0.4615 0.4399 0.3804 0.2521 0.2337]
RP28 = [0.4067 0.1564 0.1202 0.2804 0.4675 0.4626 0.4406 0.3810 0.2524 0.2342]
RP29 = [0.4054 0.1558 0.1225 0.2830 0.4692 0.4637 0.4413 0.3815 0.2528 0.2348]
RP30 = [0.4039 0.1551 0.1249 0.2855 0.4709 0.4648 0.4420 0.3821 0.2532 0.2353]
RP31 = [0.4025 0.1546 0.1273 0.2881 0.4726 0.4659 0.4428 0.3827 0.2536 0.2358]
RP32 = [0.4010 0.1540 0.1298 0.2908 0.4744 0.4671 0.4435 0.3833 0.2540 0.2364]
RP33 = [0.3994 0.1535 0.1324 0.2935 0.4762 0.4683 0.4443 0.3839 0.2544 0.2370]
RP34 = [0.3979 0.1530 0.1350 0.2962 0.4780 0.4694 0.4451 0.3845 0.2548 0.2375]

RP35 = [0.3963 0.1525 0.1377 0.2990 0.4798 0.4706 0.4458 0.3851 0.2552 0.2381]
RP36 = [0.3946 0.1521 0.1405 0.3018 0.4817 0.4718 0.4466 0.3857 0.2557 0.2387]
RP37 = [0.3930 0.1518 0.1433 0.3047 0.4836 0.4731 0.4475 0.3864 0.2561 0.2393]
RP38 = [0.3913 0.1515 0.1461 0.3075 0.4854 0.4743 0.4483 0.3870 0.2565 0.2399]
RP39 = [0.3895 0.1512 0.1490 0.3104 0.4873 0.4755 0.4491 0.3877 0.2570 0.2405]
RP40 = [0.3878 0.1510 0.1520 0.3133 0.4892 0.4768 0.4499 0.3883 0.2575 0.2411]
RP41 = [0.3860 0.1509 0.1550 0.3162 0.4911 0.4780 0.4507 0.3890 0.2579 0.2418]
RP42 = [0.3843 0.1508 0.1581 0.3191 0.4930 0.4793 0.4516 0.3896 0.2584 0.2424]
RP43 = [0.3825 0.1508 0.1611 0.3220 0.4949 0.4805 0.4524 0.3903 0.2588 0.2430]
RP44 = [0.3807 0.1509 0.1642 0.3250 0.4968 0.4818 0.4532 0.3909 0.2593 0.2437]
RP45 = [0.3788 0.1510 0.1674 0.3279 0.4987 0.4830 0.4541 0.3916 0.2598 0.2443]
RP46 = [0.3770 0.1511 0.1705 0.3308 0.5006 0.4843 0.4549 0.3923 0.2603 0.2450]
RP47 = [0.3752 0.1514 0.1737 0.3337 0.5025 0.4855 0.4557 0.3929 0.2607 0.2456]
RP48 = [0.3734 0.1517 0.1769 0.3366 0.5043 0.4868 0.4566 0.3936 0.2612 0.2462]
RP49 = [0.3715 0.1520 0.1800 0.3395 0.5062 0.4880 0.4574 0.3943 0.2617 0.2469]
RP50 = [0.3697 0.1524 0.1832 0.3423 0.5080 0.4892 0.4582 0.3949 0.2622 0.2475]
RP51 = [0.3679 0.1529 0.1864 0.3451 0.5098 0.4904 0.4590 0.3956 0.2627 0.2482]
RP52 = [0.3661 0.1534 0.1896 0.3479 0.5116 0.4916 0.4598 0.3962 0.2631 0.2488]
RP53 = [0.3643 0.1540 0.1928 0.3507 0.5134 0.4928 0.4606 0.3968 0.2636 0.2494]
RP54 = [0.3625 0.1547 0.1959 0.3534 0.5151 0.4940 0.4614 0.3975 0.2641 0.2500]
RP55 = [0.3608 0.1553 0.1990 0.3561 0.5168 0.4951 0.4622 0.3981 0.2645 0.2507]
RP56 = [0.3590 0.1561 0.2021 0.3588 0.5185 0.4963 0.4630 0.3987 0.2650 0.2513]
RP57 = [0.3573 0.1569 0.2052 0.3614 0.5202 0.4974 0.4637 0.3993 0.2655 0.2519]
RP58 = [0.3557 0.1577 0.2082 0.3639 0.5218 0.4985 0.4645 0.3999 0.2659 0.2525]
RP59 = [0.3540 0.1585 0.2112 0.3665 0.5234 0.4996 0.4652 0.4005 0.2664 0.2531]
RP60 = [0.3524 0.1594 0.2142 0.3689 0.5250 0.5006 0.4659 0.4011 0.2668 0.2536]
RP61 = [0.3508 0.1603 0.2171 0.3713 0.5265 0.5017 0.4666 0.4017 0.2672 0.2542]
RP62 = [0.3493 0.1613 0.2199 0.3737 0.5280 0.5027 0.4673 0.4022 0.2677 0.2548]
RP63 = [0.3478 0.1622 0.2227 0.3760 0.5294 0.5037 0.4680 0.4028 0.2681 0.2553]
RP64 = [0.3463 0.1632 0.2254 0.3782 0.5308 0.5046 0.4686 0.4033 0.2685 0.2558]
RP65 = [0.3449 0.1642 0.2280 0.3803 0.5322 0.5055 0.4693 0.4038 0.2689 0.2564]
RP66 = [0.3435 0.1652 0.2306 0.3824 0.5335 0.5064 0.4699 0.4043 0.2693 0.2569]
RP67 = [0.3422 0.1662 0.2331 0.3844 0.5348 0.5073 0.4705 0.4048 0.2696 0.2574]
RP68 = [0.3409 0.1672 0.2356 0.3864 0.5360 0.5082 0.4711 0.4053 0.2700 0.2578]
RP69 = [0.3397 0.1682 0.2379 0.3883 0.5372 0.5090 0.4716 0.4057 0.2703 0.2583]
RP70 = [0.3385 0.1692 0.2401 0.3901 0.5383 0.5097 0.4722 0.4061 0.2707 0.2587]
RP71 = [0.3374 0.1702 0.2423 0.3918 0.5394 0.5105 0.4727 0.4066 0.2710 0.2591]
RP72 = [0.3363 0.1711 0.2444 0.3934 0.5404 0.5112 0.4732 0.4070 0.2713 0.2596]
RP73 = [0.3353 0.1720 0.2464 0.3950 0.5414 0.5119 0.4736 0.4073 0.2716 0.2599]
RP74 = [0.3343 0.1729 0.2482 0.3965 0.5423 0.5125 0.4741 0.4077 0.2719 0.2603]
RP75 = [0.3334 0.1738 0.2500 0.3979 0.5432 0.5131 0.4745 0.4080 0.2722 0.2607]
RP76 = [0.3326 0.1746 0.2517 0.3992 0.5440 0.5137 0.4749 0.4084 0.2724 0.2610]
RP77 = [0.3318 0.1754 0.2533 0.4004 0.5448 0.5142 0.4752 0.4087 0.2727 0.2613]
RP78 = [0.3310 0.1762 0.2547 0.4016 0.5455 0.5147 0.4756 0.4089 0.2729 0.2616]
RP79 = [0.3304 0.1769 0.2561 0.4026 0.5462 0.5152 0.4759 0.4092 0.2731 0.2618]
RP80 = [0.3297 0.1775 0.2573 0.4036 0.5468 0.5156 0.4762 0.4094 0.2733 0.2621]
RP81 = [0.3292 0.1781 0.2585 0.4045 0.5473 0.5160 0.4764 0.4096 0.2734 0.2623]
RP82 = [0.3287 0.1786 0.2595 0.4053 0.5478 0.5163 0.4767 0.4098 0.2736 0.2625]
RP83 = [0.3282 0.1791 0.2604 0.4060 0.5483 0.5166 0.4769 0.4100 0.2737 0.2627]
RP84 = [0.3278 0.1796 0.2611 0.4066 0.5486 0.5169 0.4771 0.4102 0.2739 0.2628]
RP85 = [0.3275 0.1799 0.2618 0.4071 0.5490 0.5171 0.4772 0.4103 0.2740 0.2630]

RP86 = [0.3272 0.1802 0.2624 0.4075 0.5492 0.5173 0.4774 0.4104 0.2740 0.2631]
RP87 = [0.3270 0.1804 0.2628 0.4078 0.5494 0.5174 0.4774 0.4105 0.2741 0.2631]
RP88 = [0.3269 0.1806 0.2631 0.4081 0.5496 0.5175 0.4775 0.4105 0.2741 0.2632]
RP89 = [0.3268 0.1807 0.2633 0.4082 0.5497 0.5176 0.4776 0.4106 0.2742 0.2632]

AP1 = [0.5741 - 0.0000i 0.8295 - 0.0000i 0.9112 - 0.0000i 0.7575 - 0.0000i 0.5585 - 0.0000i 0.5540 - 0.0000i 0.5702 - 0.0000i 0.6274 - 0.0000i 0.7530 - 0.0000i 0.7734 - 0.0000i]
AP2 = [0.5741 - 0.0000i 0.8295 - 0.0000i 0.9111 - 0.0000i 0.7574 - 0.0000i 0.5583 - 0.0000i 0.5540 - 0.0000i 0.5702 - 0.0000i 0.6273 - 0.0000i 0.7530 - 0.0000i 0.7733 - 0.0000i]
AP3 = [0.5742 - 0.0000i 0.8297 - 0.0000i 0.9109 - 0.0000i 0.7571 - 0.0000i 0.5582 - 0.0000i 0.5538 - 0.0000i 0.5701 - 0.0000i 0.6273 - 0.0000i 0.7529 - 0.0000i 0.7733 - 0.0000i]
AP4 = [0.5744 - 0.0000i 0.8298 - 0.0000i 0.9106 - 0.0000i 0.7567 - 0.0000i 0.5579 - 0.0000i 0.5537 - 0.0000i 0.5700 - 0.0000i 0.6272 - 0.0000i 0.7529 - 0.0000i 0.7732 - 0.0000i]
AP5 = [0.5746 - 0.0000i 0.8301 - 0.0000i 0.9103 - 0.0000i 0.7563 - 0.0000i 0.5576 - 0.0000i 0.5535 - 0.0000i 0.5699 - 0.0000i 0.6271 - 0.0000i 0.7528 - 0.0000i 0.7731 - 0.0000i]
AP6 = [0.5749 - 0.0000i 0.8303 - 0.0000i 0.9099 - 0.0000i 0.7557 - 0.0000i 0.5572 - 0.0000i 0.5532 - 0.0000i 0.5697 - 0.0000i 0.6270 - 0.0000i 0.7527 - 0.0000i 0.7730 - 0.0000i]
AP7 = [0.5752 - 0.0000i 0.8306 - 0.0000i 0.9093 - 0.0000i 0.7550 - 0.0000i 0.5567 - 0.0000i 0.5529 - 0.0000i 0.5695 - 0.0000i 0.6268 - 0.0000i 0.7526 - 0.0000i 0.7729 - 0.0000i]
AP8 = [0.5756 - 0.0000i 0.8310 - 0.0000i 0.9087 - 0.0000i 0.7542 - 0.0000i 0.5562 - 0.0000i 0.5526 - 0.0000i 0.5693 - 0.0000i 0.6267 - 0.0000i 0.7525 - 0.0000i 0.7727 - 0.0000i]
AP9 = [0.5760 - 0.0000i 0.8314 - 0.0000i 0.9081 - 0.0000i 0.7534 - 0.0000i 0.5555 - 0.0000i 0.5522 - 0.0000i 0.5690 - 0.0000i 0.6265 - 0.0000i 0.7524 - 0.0000i 0.7725 - 0.0000i]
AP10 = [0.5765 - 0.0000i 0.8318 - 0.0000i 0.9073 - 0.0000i 0.7524 - 0.0000i 0.5549 - 0.0000i 0.5517 - 0.0000i 0.5687 - 0.0000i 0.6262 - 0.0000i 0.7523 - 0.0000i 0.7723 - 0.0000i]
AP11 = [0.5770 - 0.0000i 0.8323 - 0.0000i 0.9065 - 0.0000i 0.7513 - 0.0000i 0.5541 - 0.0000i 0.5513 - 0.0000i 0.5684 - 0.0000i 0.6260 - 0.0000i 0.7521 - 0.0000i 0.7721 - 0.0000i]
AP12 = [0.5776 - 0.0000i 0.8328 - 0.0000i 0.9056 - 0.0000i 0.7501 - 0.0000i 0.5533 - 0.0000i 0.5507 - 0.0000i 0.5681 - 0.0000i 0.6257 - 0.0000i 0.7520 - 0.0000i 0.7719 - 0.0000i]
AP13 = [0.5782 - 0.0000i 0.8334 - 0.0000i 0.9046 - 0.0000i 0.7488 - 0.0000i 0.5524 - 0.0000i 0.5502 - 0.0000i 0.5677 - 0.0000i 0.6255 - 0.0000i 0.7518 - 0.0000i 0.7716 - 0.0000i]
AP14 = [0.5788 - 0.0000i 0.8340 - 0.0000i 0.9035 - 0.0000i 0.7475 - 0.0000i 0.5515 - 0.0000i 0.5496 - 0.0000i 0.5673 - 0.0000i 0.6252 - 0.0000i 0.7516 - 0.0000i 0.7714 - 0.0000i]
AP15 = [0.5795 - 0.0000i 0.8346 - 0.0000i 0.9023 - 0.0000i 0.7460 - 0.0000i 0.5505 - 0.0000i 0.5489 - 0.0000i 0.5669 - 0.0000i 0.6248 - 0.0000i 0.7514 - 0.0000i 0.7711 - 0.0000i]
AP16 = [0.5803 - 0.0000i 0.8352 - 0.0000i 0.9011 - 0.0000i 0.7445 - 0.0000i 0.5494 - 0.0000i 0.5483 - 0.0000i 0.5665 - 0.0000i 0.6245 - 0.0000i 0.7512 - 0.0000i 0.7708 - 0.0000i]
AP17 = [0.5811 - 0.0000i 0.8359 - 0.0000i 0.8998 - 0.0000i 0.7428 - 0.0000i 0.5483 - 0.0000i 0.5475 - 0.0000i 0.5660 - 0.0000i 0.6241 - 0.0000i 0.7509 - 0.0000i 0.7705 - 0.0000i]
AP18 = [0.5820 - 0.0000i 0.8365 - 0.0000i 0.8984 - 0.0000i 0.7411 - 0.0000i 0.5471 - 0.0000i 0.5468 - 0.0000i 0.5655 - 0.0000i 0.6238 - 0.0000i 0.7507 - 0.0000i 0.7701 - 0.0000i]
AP19 = [0.5829 - 0.0000i 0.8372 - 0.0000i 0.8969 - 0.0000i 0.7393 - 0.0000i 0.5458 - 0.0000i 0.5460 - 0.0000i 0.5650 - 0.0000i 0.6234 - 0.0000i 0.7504 - 0.0000i 0.7697 - 0.0000i]
AP20 = [0.5839 - 0.0000i 0.8379 - 0.0000i 0.8953 - 0.0000i 0.7374 - 0.0000i 0.5445 - 0.0000i 0.5451 - 0.0000i 0.5645 - 0.0000i 0.6229 - 0.0000i 0.7502 - 0.0000i 0.7694 - 0.0000i]
AP21 = [0.5849 - 0.0000i 0.8386 - 0.0000i 0.8936 - 0.0000i 0.7354 - 0.0000i 0.5432 - 0.0000i 0.5443 - 0.0000i 0.5639 - 0.0000i 0.6225 - 0.0000i 0.7499 - 0.0000i 0.7690 - 0.0000i]
AP22 = [0.5859 - 0.0000i 0.8394 - 0.0000i 0.8919 - 0.0000i 0.7333 - 0.0000i 0.5418 - 0.0000i 0.5434 - 0.0000i 0.5633 - 0.0000i 0.6221 - 0.0000i 0.7496 - 0.0000i 0.7686 - 0.0000i]

AP23 = [0.5870 - 0.0000i 0.8401 - 0.0000i 0.8901 - 0.0000i 0.7312 - 0.0000i 0.5404 - 0.0000i 0.5425 - 0.0000i 0.5627 - 0.0000i 0.6216 - 0.0000i 0.7493 - 0.0000i 0.7681 - 0.0000i]
AP24 = [0.5882 - 0.0000i 0.8408 - 0.0000i 0.8882 - 0.0000i 0.7290 - 0.0000i 0.5389 - 0.0000i 0.5415 - 0.0000i 0.5621 - 0.0000i 0.6211 - 0.0000i 0.7490 - 0.0000i 0.7677 - 0.0000i]
AP25 = [0.5894 - 0.0000i 0.8415 - 0.0000i 0.8862 - 0.0000i 0.7267 - 0.0000i 0.5373 - 0.0000i 0.5405 - 0.0000i 0.5615 - 0.0000i 0.6206 - 0.0000i 0.7486 - 0.0000i 0.7672 - 0.0000i]
AP26 = [0.5906 - 0.0000i 0.8422 - 0.0000i 0.8841 - 0.0000i 0.7244 - 0.0000i 0.5358 - 0.0000i 0.5395 - 0.0000i 0.5608 - 0.0000i 0.6201 - 0.0000i 0.7483 - 0.0000i 0.7667 - 0.0000i]
AP27 = [0.5919 - 0.0000i 0.8429 - 0.0000i 0.8820 - 0.0000i 0.7220 - 0.0000i 0.5342 - 0.0000i 0.5385 - 0.0000i 0.5601 - 0.0000i 0.6196 - 0.0000i 0.7479 - 0.0000i 0.7663 - 0.0000i]
AP28 = [0.5933 - 0.0000i 0.8436 - 0.0000i 0.8798 - 0.0000i 0.7196 - 0.0000i 0.5325 - 0.0000i 0.5374 - 0.0000i 0.5594 - 0.0000i 0.6190 - 0.0000i 0.7476 - 0.0000i 0.7658 - 0.0000i]
AP29 = [0.5946 - 0.0000i 0.8442 - 0.0000i 0.8775 - 0.0000i 0.7170 - 0.0000i 0.5308 - 0.0000i 0.5363 - 0.0000i 0.5587 - 0.0000i 0.6185 - 0.0000i 0.7472 - 0.0000i 0.7652 - 0.0000i]
AP30 = [0.5961 - 0.0000i 0.8449 - 0.0000i 0.8751 - 0.0000i 0.7145 - 0.0000i 0.5291 - 0.0000i 0.5352 - 0.0000i 0.5580 - 0.0000i 0.6179 - 0.0000i 0.7468 - 0.0000i 0.7647 - 0.0000i]
AP31 = [0.5975 - 0.0000i 0.8454 - 0.0000i 0.8727 - 0.0000i 0.7119 - 0.0000i 0.5274 - 0.0000i 0.5341 - 0.0000i 0.5572 - 0.0000i 0.6173 - 0.0000i 0.7464 - 0.0000i 0.7642 - 0.0000i]
AP32 = [0.5990 - 0.0000i 0.8460 - 0.0000i 0.8702 - 0.0000i 0.7092 - 0.0000i 0.5256 - 0.0000i 0.5329 - 0.0000i 0.5565 - 0.0000i 0.6167 - 0.0000i 0.7460 - 0.0000i 0.7636 - 0.0000i]
AP33 = [0.6006 - 0.0000i 0.8465 - 0.0000i 0.8676 - 0.0000i 0.7065 - 0.0000i 0.5238 - 0.0000i 0.5317 - 0.0000i 0.5557 - 0.0000i 0.6161 - 0.0000i 0.7456 - 0.0000i 0.7630 - 0.0000i]
AP34 = [0.6021 - 0.0000i 0.8470 - 0.0000i 0.8650 - 0.0000i 0.7038 - 0.0000i 0.5220 - 0.0000i 0.5306 - 0.0000i 0.5549 - 0.0000i 0.6155 - 0.0000i 0.7452 - 0.0000i 0.7625 - 0.0000i]
AP35 = [0.6037 - 0.0000i 0.8475 - 0.0000i 0.8623 - 0.0000i 0.7010 - 0.0000i 0.5202 - 0.0000i 0.5294 - 0.0000i 0.5542 - 0.0000i 0.6149 - 0.0000i 0.7448 - 0.0000i 0.7619 - 0.0000i]
AP36 = [0.6054 - 0.0000i 0.8479 - 0.0000i 0.8595 - 0.0000i 0.6982 - 0.0000i 0.5183 - 0.0000i 0.5282 - 0.0000i 0.5534 - 0.0000i 0.6143 - 0.0000i 0.7443 - 0.0000i 0.7613 - 0.0000i]
AP37 = [0.6070 - 0.0000i 0.8482 - 0.0000i 0.8567 - 0.0000i 0.6953 - 0.0000i 0.5164 - 0.0000i 0.5269 - 0.0000i 0.5525 - 0.0000i 0.6136 - 0.0000i 0.7439 - 0.0000i 0.7607 - 0.0000i]
AP38 = [0.6087 - 0.0000i 0.8485 - 0.0000i 0.8539 - 0.0000i 0.6925 - 0.0000i 0.5146 - 0.0000i 0.5257 - 0.0000i 0.5517 - 0.0000i 0.6130 - 0.0000i 0.7435 - 0.0000i 0.7601 - 0.0000i]
AP39 = [0.6105 - 0.0000i 0.8488 - 0.0000i 0.8510 - 0.0000i 0.6896 - 0.0000i 0.5127 - 0.0000i 0.5245 - 0.0000i 0.5509 - 0.0000i 0.6123 - 0.0000i 0.7430 - 0.0000i 0.7595 - 0.0000i]
AP40 = [0.6122 - 0.0000i 0.8490 - 0.0000i 0.8480 - 0.0000i 0.6867 - 0.0000i 0.5108 - 0.0000i 0.5232 - 0.0000i 0.5501 - 0.0000i 0.6117 - 0.0000i 0.7425 - 0.0000i 0.7589 - 0.0000i]
AP41 = [0.6140 - 0.0000i 0.8491 - 0.0000i 0.8450 - 0.0000i 0.6838 - 0.0000i 0.5089 - 0.0000i 0.5220 - 0.0000i 0.5493 - 0.0000i 0.6110 - 0.0000i 0.7421 - 0.0000i 0.7582 - 0.0000i]
AP42 = [0.6157 - 0.0000i 0.8492 - 0.0000i 0.8419 - 0.0000i 0.6809 - 0.0000i 0.5070 - 0.0000i 0.5207 - 0.0000i 0.5484 - 0.0000i 0.6104 - 0.0000i 0.7416 - 0.0000i 0.7576 - 0.0000i]
AP43 = [0.6175 - 0.0000i 0.8492 - 0.0000i 0.8389 - 0.0000i 0.6780 - 0.0000i 0.5051 - 0.0000i 0.5195 - 0.0000i 0.5476 - 0.0000i 0.6097 - 0.0000i 0.7412 - 0.0000i 0.7570 - 0.0000i]
AP44 = [0.6193 - 0.0000i 0.8491 - 0.0000i 0.8358 - 0.0000i 0.6750 - 0.0000i 0.5032 - 0.0000i 0.5182 - 0.0000i 0.5468 - 0.0000i 0.6091 - 0.0000i 0.7407 - 0.0000i 0.7563 - 0.0000i]
AP45 = [0.6212 - 0.0000i 0.8490 - 0.0000i 0.8326 - 0.0000i 0.6721 - 0.0000i 0.5013 - 0.0000i 0.5170 - 0.0000i 0.5459 - 0.0000i 0.6084 - 0.0000i 0.7402 - 0.0000i 0.7557 - 0.0000i]
AP46 = [0.6230 - 0.0000i 0.8489 - 0.0000i 0.8295 - 0.0000i 0.6692 - 0.0000i 0.4994 - 0.0000i 0.5157 - 0.0000i 0.5451 - 0.0000i 0.6077 - 0.0000i 0.7397 - 0.0000i 0.7550 - 0.0000i]
AP47 = [0.6248 - 0.0000i 0.8486 - 0.0000i 0.8263 - 0.0000i 0.6663 - 0.0000i 0.4975 - 0.0000i 0.5145 - 0.0000i 0.5443 - 0.0000i 0.6071 - 0.0000i 0.7393 - 0.0000i 0.7544 - 0.0000i]

AP48 = [0.6266 - 0.0000i 0.8483 - 0.0000i 0.8231 - 0.0000i 0.6634 - 0.0000i 0.4957 - 0.0000i 0.5132 - 0.0000i 0.5434 - 0.0000i 0.6064 - 0.0000i 0.7388 - 0.0000i 0.7538 - 0.0000i]
AP49 = [0.6285 - 0.0000i 0.8480 - 0.0000i 0.8200 - 0.0000i 0.6605 - 0.0000i 0.4938 - 0.0000i 0.5120 - 0.0000i 0.5426 - 0.0000i 0.6057 - 0.0000i 0.7383 - 0.0000i 0.7531 - 0.0000i]
AP50 = [0.6303 - 0.0000i 0.8476 - 0.0000i 0.8168 - 0.0000i 0.6577 - 0.0000i 0.4920 - 0.0000i 0.5108 - 0.0000i 0.5418 - 0.0000i 0.6051 - 0.0000i 0.7378 - 0.0000i 0.7525 - 0.0000i]
AP51 = [0.6321 - 0.0000i 0.8471 - 0.0000i 0.8136 - 0.0000i 0.6549 - 0.0000i 0.4902 - 0.0000i 0.5096 - 0.0000i 0.5410 - 0.0000i 0.6044 - 0.0000i 0.7373 - 0.0000i 0.7518 - 0.0000i]
AP52 = [0.6339 - 0.0000i 0.8466 - 0.0000i 0.8104 - 0.0000i 0.6521 - 0.0000i 0.4884 - 0.0000i 0.5084 - 0.0000i 0.5402 - 0.0000i 0.6038 - 0.0000i 0.7369 - 0.0000i 0.7512 - 0.0000i]
AP53 = [0.6357 - 0.0000i 0.8460 - 0.0000i 0.8072 - 0.0000i 0.6493 - 0.0000i 0.4866 - 0.0000i 0.5072 - 0.0000i 0.5394 - 0.0000i 0.6032 - 0.0000i 0.7364 - 0.0000i 0.7506 - 0.0000i]
AP54 = [0.6375 - 0.0000i 0.8453 - 0.0000i 0.8041 - 0.0000i 0.6466 - 0.0000i 0.4849 - 0.0000i 0.5060 - 0.0000i 0.5386 - 0.0000i 0.6025 - 0.0000i 0.7359 - 0.0000i 0.7500 - 0.0000i]
AP55 = [0.6392 - 0.0000i 0.8447 - 0.0000i 0.8010 - 0.0000i 0.6439 - 0.0000i 0.4832 - 0.0000i 0.5049 - 0.0000i 0.5378 - 0.0000i 0.6019 - 0.0000i 0.7355 - 0.0000i 0.7493 - 0.0000i]
AP56 = [0.6410 - 0.0000i 0.8439 - 0.0000i 0.7979 - 0.0000i 0.6412 - 0.0000i 0.4815 - 0.0000i 0.5037 - 0.0000i 0.5370 - 0.0000i 0.6013 - 0.0000i 0.7350 - 0.0000i 0.7487 - 0.0000i]
AP57 = [0.6427 - 0.0000i 0.8431 - 0.0000i 0.7948 - 0.0000i 0.6386 - 0.0000i 0.4798 - 0.0000i 0.5026 - 0.0000i 0.5363 - 0.0000i 0.6007 - 0.0000i 0.7345 - 0.0000i 0.7481 - 0.0000i]
AP58 = [0.6443 - 0.0000i 0.8423 - 0.0000i 0.7918 - 0.0000i 0.6361 - 0.0000i 0.4782 - 0.0000i 0.5015 - 0.0000i 0.5355 - 0.0000i 0.6001 - 0.0000i 0.7341 - 0.0000i 0.7475 - 0.0000i]
AP59 = [0.6460 - 0.0000i 0.8415 - 0.0000i 0.7888 - 0.0000i 0.6335 - 0.0000i 0.4766 - 0.0000i 0.5004 - 0.0000i 0.5348 - 0.0000i 0.5995 - 0.0000i 0.7336 - 0.0000i 0.7469 - 0.0000i]
AP60 = [0.6476 - 0.0000i 0.8406 - 0.0000i 0.7858 - 0.0000i 0.6311 - 0.0000i 0.4750 - 0.0000i 0.4994 - 0.0000i 0.5341 - 0.0000i 0.5989 - 0.0000i 0.7332 - 0.0000i 0.7464 - 0.0000i]
AP61 = [0.6492 - 0.0000i 0.8397 - 0.0000i 0.7829 - 0.0000i 0.6287 - 0.0000i 0.4735 - 0.0000i 0.4983 - 0.0000i 0.5334 - 0.0000i 0.5983 - 0.0000i 0.7328 - 0.0000i 0.7458 - 0.0000i]
AP62 = [0.6507 - 0.0000i 0.8387 - 0.0000i 0.7801 - 0.0000i 0.6263 - 0.0000i 0.4720 - 0.0000i 0.4973 - 0.0000i 0.5327 - 0.0000i 0.5978 - 0.0000i 0.7323 - 0.0000i 0.7452 - 0.0000i]
AP63 = [0.6522 - 0.0000i 0.8378 - 0.0000i 0.7773 - 0.0000i 0.6240 - 0.0000i 0.4706 - 0.0000i 0.4963 - 0.0000i 0.5320 - 0.0000i 0.5972 - 0.0000i 0.7319 - 0.0000i 0.7447 - 0.0000i]
AP64 = [0.6537 - 0.0000i 0.8368 - 0.0000i 0.7746 - 0.0000i 0.6218 - 0.0000i 0.4692 - 0.0000i 0.4954 - 0.0000i 0.5314 - 0.0000i 0.5967 - 0.0000i 0.7315 - 0.0000i 0.7442 - 0.0000i]
AP65 = [0.6551 - 0.0000i 0.8358 - 0.0000i 0.7720 - 0.0000i 0.6197 - 0.0000i 0.4678 - 0.0000i 0.4945 - 0.0000i 0.5307 - 0.0000i 0.5962 - 0.0000i 0.7311 - 0.0000i 0.7436 - 0.0000i]
AP66 = [0.6565 - 0.0000i 0.8348 - 0.0000i 0.7694 - 0.0000i 0.6176 - 0.0000i 0.4665 - 0.0000i 0.4936 - 0.0000i 0.5301 - 0.0000i 0.5957 - 0.0000i 0.7307 - 0.0000i 0.7431 - 0.0000i]
AP67 = [0.6578 - 0.0000i 0.8338 - 0.0000i 0.7669 - 0.0000i 0.6156 - 0.0000i 0.4652 - 0.0000i 0.4927 - 0.0000i 0.5295 - 0.0000i 0.5952 - 0.0000i 0.7304 - 0.0000i 0.7426 - 0.0000i]
AP68 = [0.6591 - 0.0000i 0.8328 - 0.0000i 0.7644 - 0.0000i 0.6136 - 0.0000i 0.4640 - 0.0000i 0.4918 - 0.0000i 0.5289 - 0.0000i 0.5947 - 0.0000i 0.7300 - 0.0000i 0.7422 - 0.0000i]
AP69 = [0.6603 - 0.0000i 0.8318 - 0.0000i 0.7621 - 0.0000i 0.6117 - 0.0000i 0.4628 - 0.0000i 0.4910 - 0.0000i 0.5284 - 0.0000i 0.5943 - 0.0000i 0.7297 - 0.0000i 0.7417 - 0.0000i]
AP70 = [0.6615 - 0.0000i 0.8308 - 0.0000i 0.7599 - 0.0000i 0.6099 - 0.0000i 0.4617 - 0.0000i 0.4903 - 0.0000i 0.5278 - 0.0000i 0.5939 - 0.0000i 0.7293 - 0.0000i 0.7413 - 0.0000i]
AP71 = [0.6626 - 0.0000i 0.8298 - 0.0000i 0.7577 - 0.0000i 0.6082 - 0.0000i 0.4606 - 0.0000i 0.4895 - 0.0000i 0.5273 - 0.0000i 0.5934 - 0.0000i 0.7290 - 0.0000i 0.7409 - 0.0000i]
AP72 = [0.6637 - 0.0000i 0.8289 - 0.0000i 0.7556 - 0.0000i 0.6066 - 0.0000i 0.4596 - 0.0000i 0.4888 - 0.0000i 0.5268 - 0.0000i 0.5930 - 0.0000i 0.7287 - 0.0000i 0.7404 - 0.0000i]

AP73 = [0.6647 - 0.0000i   0.8280 - 0.0000i   0.7536 - 0.0000i   0.6050 - 0.0000i   0.4586 - 0.0000i   0.4881 - 0.0000i   0.5264 - 0.0000i   0.5927 - 0.0000i 0.7284 - 0.0000i   0.7401 - 0.0000i]
AP74 = [0.6657 - 0.0000i   0.8271 - 0.0000i   0.7518 - 0.0000i   0.6035 - 0.0000i   0.4577 - 0.0000i   0.4875 - 0.0000i   0.5259 - 0.0000i   0.5923 - 0.0000i 0.7281 - 0.0000i   0.7397 - 0.0000i]
AP75 = [0.6666 - 0.0000i   0.8262 - 0.0000i   0.7500 - 0.0000i   0.6021 - 0.0000i   0.4568 - 0.0000i   0.4869 - 0.0000i   0.5255 - 0.0000i   0.5920 - 0.0000i 0.7278 - 0.0000i   0.7393 - 0.0000i]
AP76 = [0.6674 - 0.0000i   0.8254 - 0.0000i   0.7483 - 0.0000i   0.6008 - 0.0000i   0.4560 - 0.0000i   0.4863 - 0.0000i   0.5251 - 0.0000i   0.5916 - 0.0000i 0.7276 - 0.0000i   0.7390 - 0.0000i]
AP77 = [0.6682 - 0.0000i   0.8246 - 0.0000i   0.7467 - 0.0000i   0.5996 - 0.0000i   0.4552 - 0.0000i   0.4858 - 0.0000i   0.5248 - 0.0000i   0.5913 - 0.0000i 0.7273 - 0.0000i   0.7387 - 0.0000i]
AP78 = [0.6690 - 0.0000i   0.8238 - 0.0000i   0.7453 - 0.0000i   0.5984 - 0.0000i   0.4545 - 0.0000i   0.4853 - 0.0000i   0.5244 - 0.0000i   0.5911 - 0.0000i 0.7271 - 0.0000i   0.7384 - 0.0000i]
AP79 = [0.6696 - 0.0000i   0.8231 - 0.0000i   0.7439 - 0.0000i   0.5974 - 0.0000i   0.4538 - 0.0000i   0.4848 - 0.0000i   0.5241 - 0.0000i   0.5908 - 0.0000i 0.7269 - 0.0000i   0.7382 - 0.0000i]
AP80 = [0.6703 - 0.0000i   0.8225 - 0.0000i   0.7427 - 0.0000i   0.5964 - 0.0000i   0.4532 - 0.0000i   0.4844 - 0.0000i   0.5238 - 0.0000i   0.5906 - 0.0000i 0.7267 - 0.0000i   0.7379 - 0.0000i]
AP81 = [0.6708 - 0.0000i   0.8219 - 0.0000i   0.7415 - 0.0000i   0.5955 - 0.0000i   0.4527 - 0.0000i   0.4840 - 0.0000i   0.5236 - 0.0000i   0.5904 - 0.0000i 0.7266 - 0.0000i   0.7377 - 0.0000i]
AP82 = [0.6713 - 0.0000i   0.8214 - 0.0000i   0.7405 - 0.0000i   0.5947 - 0.0000i   0.4522 - 0.0000i   0.4837 - 0.0000i   0.5233 - 0.0000i   0.5902 - 0.0000i 0.7264 - 0.0000i   0.7375 - 0.0000i]
AP83 = [0.6718 - 0.0000i   0.8209 - 0.0000i   0.7396 - 0.0000i   0.5940 - 0.0000i   0.4517 - 0.0000i   0.4834 - 0.0000i   0.5231 - 0.0000i   0.5900 - 0.0000i 0.7263 - 0.0000i   0.7373 - 0.0000i]
AP84 = [0.6722 - 0.0000i   0.8204 - 0.0000i   0.7389 - 0.0000i   0.5934 - 0.0000i   0.4514 - 0.0000i   0.4831 - 0.0000i   0.5229 - 0.0000i   0.5898 - 0.0000i 0.7261 - 0.0000i   0.7372 - 0.0000i]
AP85 = [0.6725 - 0.0000i   0.8201 - 0.0000i   0.7382 - 0.0000i   0.5929 - 0.0000i   0.4510 - 0.0000i   0.4829 - 0.0000i   0.5228 - 0.0000i   0.5897 - 0.0000i 0.7260 - 0.0000i   0.7370 - 0.0000i]
AP86 = [0.6728 - 0.0000i   0.8198 - 0.0000i   0.7376 - 0.0000i   0.5925 - 0.0000i   0.4508 - 0.0000i   0.4827 - 0.0000i   0.5226 - 0.0000i   0.5896 - 0.0000i 0.7260 - 0.0000i   0.7369 - 0.0000i]
AP87 = [0.6730 - 0.0000i   0.8196 - 0.0000i   0.7372 - 0.0000i   0.5922 - 0.0000i   0.4506 - 0.0000i   0.4826 - 0.0000i   0.5226 - 0.0000i   0.5895 - 0.0000i 0.7259 - 0.0000i   0.7369 - 0.0000i]
AP88 = [0.6731 - 0.0000i   0.8194 - 0.0000i   0.7369 - 0.0000i   0.5919 - 0.0000i   0.4504 - 0.0000i   0.4825 - 0.0000i   0.5225 - 0.0000i   0.5895 - 0.0000i 0.7259 - 0.0000i   0.7368 - 0.0000i]
AP89 = [0.6732 - 0.0000i   0.8193 - 0.0000i   0.7367 - 0.0000i   0.5918 - 0.0000i   0.4503 - 0.0000i   0.4824 - 0.0000i   0.5224 - 0.0000i   0.5894 - 0.0000i 0.7258 - 0.0000i   0.7368 - 0.0000i]

Values for p – polarization

RP1 = [0.4260   0.1705   0.0887   0.2424   0.4415   0.4460   0.4298   0.3726   0.2470   0.2266]
RP2 = [0.4260   0.1705   0.0888   0.2422   0.4415   0.4460   0.4298   0.3727   0.2470   0.2267]
RP3 = [0.4260   0.1704   0.0889   0.2420   0.4416   0.4460   0.4299   0.3729   0.2470   0.2268]
RP4 = [0.4260   0.1702   0.0890   0.2417   0.4416   0.4460   0.4300   0.3730   0.2470   0.2269]
RP5 = [0.4260   0.1701   0.0892   0.2413   0.4417   0.4461   0.4302   0.3733   0.2470   0.2270]
RP6 = [0.4260   0.1698   0.0894   0.2409   0.4418   0.4461   0.4303   0.3736   0.2470   0.2272]
RP7 = [0.4260   0.1696   0.0897   0.2403   0.4419   0.4462   0.4305   0.3739   0.2470   0.2274]
RP8 = [0.4261   0.1693   0.0900   0.2397   0.4420   0.4462   0.4308   0.3743   0.2470   0.2276]
RP9 = [0.4261   0.1690   0.0903   0.2391   0.4421   0.4463   0.4310   0.3748   0.2470   0.2279]
RP10 = [0.4261   0.1686   0.0907   0.2383   0.4422   0.4464   0.4313   0.3753   0.2470   0.2282]
RP11 = [0.4261   0.1682   0.0911   0.2375   0.4424   0.4465   0.4316   0.3758   0.2470   0.2285]
RP12 = [0.4262   0.1677   0.0916   0.2366   0.4426   0.4466   0.4320   0.3764   0.2470   0.2289]

RP13 = [0.4262 0.1673 0.0922 0.2357 0.4428 0.4468 0.4324 0.3771 0.2470 0.2293]
RP14 = [0.4262 0.1667 0.0928 0.2347 0.4430 0.4469 0.4328 0.3778 0.2470 0.2297]
RP15 = [0.4262 0.1662 0.0934 0.2337 0.4433 0.4471 0.4333 0.3786 0.2470 0.2302]
RP16 = [0.4262 0.1656 0.0942 0.2326 0.4436 0.4473 0.4338 0.3794 0.2471 0.2307]
RP17 = [0.4262 0.1650 0.0950 0.2315 0.4439 0.4475 0.4343 0.3803 0.2471 0.2312]
RP18 = [0.4262 0.1643 0.0958 0.2304 0.4442 0.4477 0.4349 0.3813 0.2472 0.2319]
RP19 = [0.4262 0.1637 0.0968 0.2293 0.4446 0.4480 0.4355 0.3823 0.2472 0.2325]
RP20 = [0.4262 0.1629 0.0978 0.2281 0.4450 0.4482 0.4362 0.3833 0.2473 0.2332]
RP21 = [0.4262 0.1622 0.0989 0.2270 0.4455 0.4485 0.4369 0.3845 0.2473 0.2339]
RP22 = [0.4261 0.1614 0.1001 0.2258 0.4460 0.4489 0.4376 0.3856 0.2474 0.2347]
RP23 = [0.4261 0.1606 0.1014 0.2247 0.4465 0.4492 0.4384 0.3869 0.2475 0.2356]
RP24 = [0.4260 0.1598 0.1028 0.2236 0.4471 0.4496 0.4392 0.3881 0.2477 0.2365]
RP25 = [0.4259 0.1590 0.1043 0.2225 0.4478 0.4501 0.4401 0.3895 0.2478 0.2375]
RP26 = [0.4258 0.1581 0.1059 0.2214 0.4485 0.4505 0.4410 0.3909 0.2480 0.2385]
RP27 = [0.4257 0.1573 0.1077 0.2204 0.4492 0.4510 0.4419 0.3924 0.2482 0.2396]
RP28 = [0.4256 0.1564 0.1096 0.2194 0.4501 0.4516 0.4429 0.3939 0.2484 0.2408]
RP29 = [0.4255 0.1555 0.1116 0.2184 0.4510 0.4522 0.4440 0.3955 0.2486 0.2421]
RP30 = [0.4253 0.1546 0.1138 0.2176 0.4519 0.4528 0.4451 0.3972 0.2489 0.2434]
RP31 = [0.4251 0.1537 0.1162 0.2168 0.4530 0.4535 0.4463 0.3989 0.2492 0.2449]
RP32 = [0.4249 0.1529 0.1187 0.2160 0.4541 0.4543 0.4475 0.4008 0.2496 0.2464]
RP33 = [0.4246 0.1520 0.1215 0.2154 0.4553 0.4551 0.4488 0.4026 0.2500 0.2480]
RP34 = [0.4244 0.1512 0.1244 0.2148 0.4566 0.4560 0.4501 0.4046 0.2505 0.2497]
RP35 = [0.4241 0.1503 0.1276 0.2144 0.4579 0.4569 0.4515 0.4066 0.2510 0.2516]
RP36 = [0.4238 0.1496 0.1310 0.2140 0.4594 0.4580 0.4530 0.4087 0.2515 0.2535]
RP37 = [0.4234 0.1488 0.1346 0.2138 0.4610 0.4590 0.4546 0.4109 0.2522 0.2556]
RP38 = [0.4230 0.1481 0.1386 0.2136 0.4627 0.4602 0.4562 0.4132 0.2529 0.2578]
RP39 = [0.4226 0.1475 0.1428 0.2136 0.4645 0.4615 0.4579 0.4156 0.2536 0.2602]
RP40 = [0.4222 0.1470 0.1473 0.2138 0.4665 0.4628 0.4597 0.4180 0.2545 0.2627]
RP41 = [0.4217 0.1466 0.1521 0.2140 0.4686 0.4642 0.4616 0.4206 0.2554 0.2654]
RP42 = [0.4212 0.1463 0.1573 0.2144 0.4708 0.4658 0.4635 0.4232 0.2565 0.2683]
RP43 = [0.4206 0.1461 0.1629 0.2150 0.4731 0.4674 0.4656 0.4260 0.2576 0.2714]
RP44 = [0.4201 0.1461 0.1688 0.2157 0.4756 0.4692 0.4678 0.4289 0.2589 0.2747]
RP45 = [0.4194 0.1463 0.1752 0.2166 0.4783 0.4710 0.4700 0.4319 0.2603 0.2781]
RP46 = [0.4188 0.1467 0.1821 0.2176 0.4811 0.4730 0.4724 0.4350 0.2618 0.2819]
RP47 = [0.4181 0.1474 0.1894 0.2188 0.4841 0.4751 0.4749 0.4382 0.2635 0.2858]
RP48 = [0.4175 0.1483 0.1973 0.2202 0.4873 0.4773 0.4775 0.4415 0.2653 0.2901]
RP49 = [0.4167 0.1496 0.2057 0.2218 0.4906 0.4797 0.4802 0.4450 0.2674 0.2946]
RP50 = [0.4160 0.1513 0.2146 0.2236 0.4942 0.4822 0.4831 0.4487 0.2695 0.2994]
RP51 = [0.4153 0.1533 0.2242 0.2256 0.4979 0.4848 0.4861 0.4524 0.2719 0.3045]
RP52 = [0.4145 0.1559 0.2344 0.2278 0.5018 0.4876 0.4892 0.4564 0.2745 0.3100]
RP53 = [0.4138 0.1591 0.2453 0.2301 0.5059 0.4905 0.4925 0.4605 0.2774 0.3158]
RP54 = [0.4131 0.1629 0.2569 0.2327 0.5103 0.4936 0.4959 0.4647 0.2804 0.3220]
RP55 = [0.4124 0.1674 0.2692 0.2355 0.5148 0.4969 0.4995 0.4692 0.2838 0.3285]
RP56 = [0.4117 0.1727 0.2822 0.2385 0.5196 0.5003 0.5032 0.4738 0.2874 0.3355]
RP57 = [0.4112 0.1788 0.2960 0.2417 0.5245 0.5038 0.5071 0.4786 0.2912 0.3428]
RP58 = [0.4107 0.1860 0.3106 0.2451 0.5297 0.5075 0.5112 0.4836 0.2954 0.3505]
RP59 = [0.4103 0.1943 0.3259 0.2487 0.5351 0.5114 0.5154 0.4888 0.2999 0.3587]
RP60 = [0.4102 0.2038 0.3421 0.2525 0.5407 0.5155 0.5198 0.4942 0.3047 0.3673]
RP61 = [0.4102 0.2146 0.3590 0.2565 0.5464 0.5196 0.5244 0.4998 0.3098 0.3763]
RP62 = [0.4104 0.2268 0.3766 0.2607 0.5524 0.5239 0.5292 0.5056 0.3153 0.3858]
RP63 = [0.4110 0.2405 0.3949 0.2651 0.5584 0.5284 0.5341 0.5116 0.3210 0.3956]

RP64 = [0.4120 0.2558 0.4138 0.2696 0.5647 0.5330 0.5392 0.5177 0.3271 0.4058]
RP65 = [0.4134 0.2727 0.4334 0.2743 0.5711 0.5376 0.5444 0.5241 0.3335 0.4164]
RP66 = [0.4154 0.2913 0.4534 0.2792 0.5775 0.5424 0.5497 0.5306 0.3402 0.4273]
RP67 = [0.4180 0.3116 0.4737 0.2841 0.5840 0.5473 0.5552 0.5373 0.3472 0.4384]
RP68 = [0.4213 0.3335 0.4944 0.2891 0.5906 0.5522 0.5608 0.5442 0.3544 0.4498]
RP69 = [0.4255 0.3569 0.5152 0.2942 0.5972 0.5571 0.5665 0.5511 0.3619 0.4614]
RP70 = [0.4307 0.3816 0.5359 0.2993 0.6037 0.5620 0.5723 0.5582 0.3695 0.4731]
RP71 = [0.4369 0.4075 0.5565 0.3045 0.6102 0.5669 0.5780 0.5652 0.3773 0.4848]
RP72 = [0.4443 0.4343 0.5768 0.3096 0.6166 0.5717 0.5838 0.5724 0.3852 0.4965]
RP73 = [0.4529 0.4616 0.5966 0.3147 0.6228 0.5765 0.5896 0.5795 0.3930 0.5081]
RP74 = [0.4628 0.4892 0.6157 0.3196 0.6288 0.5811 0.5953 0.5865 0.4009 0.5195]
RP75 = [0.4739 0.5166 0.6341 0.3245 0.6346 0.5856 0.6010 0.5934 0.4087 0.5306]
RP76 = [0.4862 0.5435 0.6516 0.3292 0.6401 0.5899 0.6064 0.6002 0.4163 0.5413]
RP77 = [0.4995 0.5695 0.6681 0.3337 0.6453 0.5940 0.6118 0.6068 0.4237 0.5516]
RP78 = [0.5137 0.5943 0.6834 0.3380 0.6502 0.5979 0.6169 0.6131 0.4308 0.5614]
RP79 = [0.5285 0.6177 0.6976 0.3420 0.6547 0.6015 0.6217 0.6191 0.4376 0.5706]
RP80 = [0.5435 0.6393 0.7105 0.3458 0.6588 0.6049 0.6262 0.6247 0.4439 0.5792]
RP81 = [0.5585 0.6590 0.7221 0.3492 0.6626 0.6080 0.6305 0.6300 0.4498 0.5871]
RP82 = [0.5730 0.6767 0.7325 0.3524 0.6659 0.6107 0.6343 0.6348 0.4553 0.5942]
RP83 = [0.5868 0.6923 0.7415 0.3552 0.6689 0.6132 0.6378 0.6391 0.4601 0.6006]
RP84 = [0.5994 0.7058 0.7493 0.3577 0.6714 0.6153 0.6409 0.6429 0.4644 0.6062]
RP85 = [0.6105 0.7171 0.7558 0.3598 0.6736 0.6171 0.6435 0.6462 0.4681 0.6110]
RP86 = [0.6200 0.7263 0.7611 0.3615 0.6753 0.6186 0.6457 0.6489 0.4712 0.6149]
RP87 = [0.6276 0.7334 0.7652 0.3629 0.6766 0.6197 0.6474 0.6510 0.4736 0.6179]
RP88 = [0.6331 0.7384 0.7681 0.3639 0.6776 0.6205 0.6486 0.6526 0.4753 0.6201]
RP89 = [0.6364 0.7414 0.7698 0.3644 0.6782 0.6210 0.6493 0.6535 0.4763 0.6214]

AP1 = [0.5740 - 0.0000i 0.8295 - 0.0000i 0.9113 - 0.0000i 0.7576 - 0.0000i 0.5585 - 0.0000i 0.5540 - 0.0000i 0.5702 - 0.0000i 0.6274 - 0.0000i 0.7530 - 0.0000i 0.7734 - 0.0000i]
AP2 = [0.5740 - 0.0000i 0.8295 - 0.0000i 0.9112 - 0.0000i 0.7578 - 0.0000i 0.5585 - 0.0000i 0.5540 - 0.0000i 0.5702 - 0.0000i 0.6273 - 0.0000i 0.7530 - 0.0000i 0.7733 - 0.0000i]
AP3 = [0.5740 - 0.0000i 0.8296 - 0.0000i 0.9111 - 0.0000i 0.7580 - 0.0000i 0.5584 - 0.0000i 0.5540 - 0.0000i 0.5701 - 0.0000i 0.6271 - 0.0000i 0.7530 - 0.0000i 0.7732 - 0.0000i]
AP4 = [0.5740 - 0.0000i 0.8298 - 0.0000i 0.9110 - 0.0000i 0.7583 - 0.0000i 0.5584 - 0.0000i 0.5540 - 0.0000i 0.5700 - 0.0000i 0.6270 - 0.0000i 0.7530 - 0.0000i 0.7731 - 0.0000i]
AP5 = [0.5740 - 0.0000i 0.8299 - 0.0000i 0.9108 - 0.0000i 0.7587 - 0.0000i 0.5583 - 0.0000i 0.5539 - 0.0000i 0.5698 - 0.0000i 0.6267 - 0.0000i 0.7530 - 0.0000i 0.7730 - 0.0000i]
AP6 = [0.5740 - 0.0000i 0.8302 - 0.0000i 0.9106 - 0.0000i 0.7591 - 0.0000i 0.5582 - 0.0000i 0.5539 - 0.0000i 0.5697 - 0.0000i 0.6264 - 0.0000i 0.7530 - 0.0000i 0.7728 - 0.0000i]
AP7 = [0.5740 - 0.0000i 0.8304 - 0.0000i 0.9103 - 0.0000i 0.7597 - 0.0000i 0.5581 - 0.0000i 0.5538 - 0.0000i 0.5695 - 0.0000i 0.6261 - 0.0000i 0.7530 - 0.0000i 0.7726 - 0.0000i]
AP8 = [0.5739 - 0.0000i 0.8307 - 0.0000i 0.9100 - 0.0000i 0.7603 - 0.0000i 0.5580 - 0.0000i 0.5538 - 0.0000i 0.5692 - 0.0000i 0.6257 - 0.0000i 0.7530 - 0.0000i 0.7724 - 0.0000i]
AP9 = [0.5739 - 0.0000i 0.8310 - 0.0000i 0.9097 - 0.0000i 0.7609 - 0.0000i 0.5579 - 0.0000i 0.5537 - 0.0000i 0.5690 - 0.0000i 0.6252 - 0.0000i 0.7530 - 0.0000i 0.7721 - 0.0000i]
AP10 = [0.5739 - 0.0000i 0.8314 - 0.0000i 0.9093 - 0.0000i 0.7617 - 0.0000i 0.5578 - 0.0000i 0.5536 - 0.0000i 0.5687 - 0.0000i 0.6247 - 0.0000i 0.7530 - 0.0000i 0.7718 - 0.0000i]
AP11 = [0.5739 - 0.0000i 0.8318 - 0.0000i 0.9089 - 0.0000i 0.7625 - 0.0000i 0.5576 - 0.0000i 0.5535 - 0.0000i 0.5684 - 0.0000i 0.6242 - 0.0000i 0.7530 - 0.0000i 0.7715 - 0.0000i]
AP12 = [0.5738 - 0.0000i 0.8323 - 0.0000i 0.9084 - 0.0000i 0.7634 - 0.0000i 0.5574 - 0.0000i 0.5534 - 0.0000i 0.5680 - 0.0000i 0.6236 - 0.0000i 0.7530 - 0.0000i 0.7711 - 0.0000i]

AP13 = [0.5738 - 0.0000i   0.8327 - 0.0000i   0.9078 - 0.0000i   0.7643 - 0.0000i   0.5572 - 0.0000i   0.5532 - 0.0000i   0.5676 - 0.0000i   0.6229 - 0.0000i 0.7530 - 0.0000i   0.7707 - 0.0000i]
AP14 = [0.5738 - 0.0000i   0.8333 - 0.0000i   0.9072 - 0.0000i   0.7653 - 0.0000i   0.5570 - 0.0000i   0.5531 - 0.0000i   0.5672 - 0.0000i   0.6222 - 0.0000i 0.7530 - 0.0000i   0.7703 - 0.0000i]
AP15 = [0.5738 - 0.0000i   0.8338 - 0.0000i   0.9066 - 0.0000i   0.7663 - 0.0000i   0.5567 - 0.0000i   0.5529 - 0.0000i   0.5667 - 0.0000i   0.6214 - 0.0000i 0.7530 - 0.0000i   0.7698 - 0.0000i]
AP16 = [0.5738 - 0.0000i   0.8344 - 0.0000i   0.9058 - 0.0000i   0.7674 - 0.0000i   0.5564 - 0.0000i   0.5527 - 0.0000i   0.5662 - 0.0000i   0.6206 - 0.0000i 0.7529 - 0.0000i   0.7693 - 0.0000i]
AP17 = [0.5738 - 0.0000i   0.8350 - 0.0000i   0.9050 - 0.0000i   0.7685 - 0.0000i   0.5561 - 0.0000i   0.5525 - 0.0000i   0.5657 - 0.0000i   0.6197 - 0.0000i 0.7529 - 0.0000i   0.7688 - 0.0000i]
AP18 = [0.5738 - 0.0000i   0.8357 - 0.0000i   0.9042 - 0.0000i   0.7696 - 0.0000i   0.5558 - 0.0000i   0.5523 - 0.0000i   0.5651 - 0.0000i   0.6187 - 0.0000i 0.7528 - 0.0000i   0.7681 - 0.0000i]
AP19 = [0.5738 - 0.0000i   0.8363 - 0.0000i   0.9032 - 0.0000i   0.7707 - 0.0000i   0.5554 - 0.0000i   0.5520 - 0.0000i   0.5645 - 0.0000i   0.6177 - 0.0000i 0.7528 - 0.0000i   0.7675 - 0.0000i]
AP20 = [0.5738 - 0.0000i   0.8371 - 0.0000i   0.9022 - 0.0000i   0.7719 - 0.0000i   0.5550 - 0.0000i   0.5518 - 0.0000i   0.5638 - 0.0000i   0.6167 - 0.0000i 0.7527 - 0.0000i   0.7668 - 0.0000i]
AP21 = [0.5738 - 0.0000i   0.8378 - 0.0000i   0.9011 - 0.0000i   0.7730 - 0.0000i   0.5545 - 0.0000i   0.5515 - 0.0000i   0.5631 - 0.0000i   0.6155 - 0.0000i 0.7527 - 0.0000i   0.7661 - 0.0000i]
AP22 = [0.5739 - 0.0000i   0.8386 - 0.0000i   0.8999 - 0.0000i   0.7742 - 0.0000i   0.5540 - 0.0000i   0.5511 - 0.0000i   0.5624 - 0.0000i   0.6144 - 0.0000i 0.7526 - 0.0000i   0.7653 - 0.0000i]
AP23 = [0.5739 - 0.0000i   0.8394 - 0.0000i   0.8986 - 0.0000i   0.7753 - 0.0000i   0.5535 - 0.0000i   0.5508 - 0.0000i   0.5616 - 0.0000i   0.6131 - 0.0000i 0.7525 - 0.0000i   0.7644 - 0.0000i]
AP24 = [0.5740 - 0.0000i   0.8402 - 0.0000i   0.8972 - 0.0000i   0.7764 - 0.0000i   0.5529 - 0.0000i   0.5504 - 0.0000i   0.5608 - 0.0000i   0.6119 - 0.0000i 0.7523 - 0.0000i   0.7635 - 0.0000i]
AP25 = [0.5741 - 0.0000i   0.8410 - 0.0000i   0.8957 - 0.0000i   0.7775 - 0.0000i   0.5522 - 0.0000i   0.5499 - 0.0000i   0.5599 - 0.0000i   0.6105 - 0.0000i 0.7522 - 0.0000i   0.7625 - 0.0000i]
AP26 = [0.5742 - 0.0000i   0.8419 - 0.0000i   0.8941 - 0.0000i   0.7786 - 0.0000i   0.5515 - 0.0000i   0.5495 - 0.0000i   0.5590 - 0.0000i   0.6091 - 0.0000i 0.7520 - 0.0000i   0.7615 - 0.0000i]
AP27 = [0.5743 - 0.0000i   0.8427 - 0.0000i   0.8923 - 0.0000i   0.7796 - 0.0000i   0.5508 - 0.0000i   0.5490 - 0.0000i   0.5581 - 0.0000i   0.6076 - 0.0000i 0.7518 - 0.0000i   0.7604 - 0.0000i]
AP28 = [0.5744 - 0.0000i   0.8436 - 0.0000i   0.8904 - 0.0000i   0.7806 - 0.0000i   0.5499 - 0.0000i   0.5484 - 0.0000i   0.5571 - 0.0000i   0.6061 - 0.0000i 0.7516 - 0.0000i   0.7592 - 0.0000i]
AP29 = [0.5745 - 0.0000i   0.8445 - 0.0000i   0.8884 - 0.0000i   0.7816 - 0.0000i   0.5490 - 0.0000i   0.5478 - 0.0000i   0.5560 - 0.0000i   0.6045 - 0.0000i 0.7514 - 0.0000i   0.7579 - 0.0000i]
AP30 = [0.5747 - 0.0000i   0.8454 - 0.0000i   0.8862 - 0.0000i   0.7824 - 0.0000i   0.5481 - 0.0000i   0.5472 - 0.0000i   0.5549 - 0.0000i   0.6028 - 0.0000i 0.7511 - 0.0000i   0.7566 - 0.0000i]
AP31 = [0.5749 - 0.0000i   0.8463 - 0.0000i   0.8838 - 0.0000i   0.7832 - 0.0000i   0.5470 - 0.0000i   0.5465 - 0.0000i   0.5537 - 0.0000i   0.6011 - 0.0000i 0.7508 - 0.0000i   0.7551 - 0.0000i]
AP32 = [0.5751 - 0.0000i   0.8471 - 0.0000i   0.8813 - 0.0000i   0.7840 - 0.0000i   0.5459 - 0.0000i   0.5457 - 0.0000i   0.5525 - 0.0000i   0.5992 - 0.0000i 0.7504 - 0.0000i   0.7536 - 0.0000i]
AP33 = [0.5754 - 0.0000i   0.8480 - 0.0000i   0.8785 - 0.0000i   0.7846 - 0.0000i   0.5447 - 0.0000i   0.5449 - 0.0000i   0.5512 - 0.0000i   0.5974 - 0.0000i 0.7500 - 0.0000i   0.7520 - 0.0000i]
AP34 = [0.5756 - 0.0000i   0.8488 - 0.0000i   0.8756 - 0.0000i   0.7852 - 0.0000i   0.5434 - 0.0000i   0.5440 - 0.0000i   0.5499 - 0.0000i   0.5954 - 0.0000i 0.7495 - 0.0000i   0.7503 - 0.0000i]
AP35 = [0.5759 - 0.0000i   0.8497 - 0.0000i   0.8724 - 0.0000i   0.7856 - 0.0000i   0.5421 - 0.0000i   0.5431 - 0.0000i   0.5485 - 0.0000i   0.5934 - 0.0000i 0.7490 - 0.0000i   0.7484 - 0.0000i]
AP36 = [0.5762 - 0.0000i   0.8504 - 0.0000i   0.8690 - 0.0000i   0.7860 - 0.0000i   0.5406 - 0.0000i   0.5420 - 0.0000i   0.5470 - 0.0000i   0.5913 - 0.0000i 0.7485 - 0.0000i   0.7465 - 0.0000i]
AP37 = [0.5766 - 0.0000i   0.8512 - 0.0000i   0.8654 - 0.0000i   0.7862 - 0.0000i   0.5390 - 0.0000i   0.5410 - 0.0000i   0.5454 - 0.0000i   0.5891 - 0.0000i 0.7478 - 0.0000i   0.7444 - 0.0000i]

AP38 = [0.5770 - 0.0000i 0.8519 - 0.0000i 0.8614 - 0.0000i 0.7864 - 0.0000i 0.5373 - 0.0000i 0.5398 - 0.0000i 0.5438 - 0.0000i 0.5868 - 0.0000i 0.7471 - 0.0000i 0.7422 - 0.0000i]
AP39 = [0.5774 - 0.0000i 0.8525 - 0.0000i 0.8572 - 0.0000i 0.7864 - 0.0000i 0.5355 - 0.0000i 0.5385 - 0.0000i 0.5421 - 0.0000i 0.5844 - 0.0000i 0.7464 - 0.0000i 0.7398 - 0.0000i]
AP40 = [0.5778 - 0.0000i 0.8530 - 0.0000i 0.8527 - 0.0000i 0.7862 - 0.0000i 0.5335 - 0.0000i 0.5372 - 0.0000i 0.5403 - 0.0000i 0.5820 - 0.0000i 0.7455 - 0.0000i 0.7373 - 0.0000i]
AP41 = [0.5783 - 0.0000i 0.8534 - 0.0000i 0.8479 - 0.0000i 0.7860 - 0.0000i 0.5314 - 0.0000i 0.5358 - 0.0000i 0.5384 - 0.0000i 0.5794 - 0.0000i 0.7446 - 0.0000i 0.7346 - 0.0000i]
AP42 = [0.5788 - 0.0000i 0.8537 - 0.0000i 0.8427 - 0.0000i 0.7856 - 0.0000i 0.5292 - 0.0000i 0.5342 - 0.0000i 0.5365 - 0.0000i 0.5768 - 0.0000i 0.7435 - 0.0000i 0.7317 - 0.0000i]
AP43 = [0.5794 - 0.0000i 0.8539 - 0.0000i 0.8371 - 0.0000i 0.7850 - 0.0000i 0.5269 - 0.0000i 0.5326 - 0.0000i 0.5344 - 0.0000i 0.5740 - 0.0000i 0.7424 - 0.0000i 0.7286 - 0.0000i]
AP44 = [0.5799 - 0.0000i 0.8539 - 0.0000i 0.8312 - 0.0000i 0.7843 - 0.0000i 0.5244 - 0.0000i 0.5308 - 0.0000i 0.5322 - 0.0000i 0.5711 - 0.0000i 0.7411 - 0.0000i 0.7253 - 0.0000i]
AP45 = [0.5806 - 0.0000i 0.8537 - 0.0000i 0.8248 - 0.0000i 0.7834 - 0.0000i 0.5217 - 0.0000i 0.5290 - 0.0000i 0.5300 - 0.0000i 0.5681 - 0.0000i 0.7397 - 0.0000i 0.7219 - 0.0000i]
AP46 = [0.5812 - 0.0000i 0.8533 - 0.0000i 0.8179 - 0.0000i 0.7824 - 0.0000i 0.5189 - 0.0000i 0.5270 - 0.0000i 0.5276 - 0.0000i 0.5650 - 0.0000i 0.7382 - 0.0000i 0.7181 - 0.0000i]
AP47 = [0.5819 - 0.0000i 0.8526 - 0.0000i 0.8106 - 0.0000i 0.7812 - 0.0000i 0.5159 - 0.0000i 0.5249 - 0.0000i 0.5251 - 0.0000i 0.5618 - 0.0000i 0.7365 - 0.0000i 0.7142 - 0.0000i]
AP48 = [0.5825 - 0.0000i 0.8517 - 0.0000i 0.8027 - 0.0000i 0.7798 - 0.0000i 0.5127 - 0.0000i 0.5227 - 0.0000i 0.5225 - 0.0000i 0.5585 - 0.0000i 0.7347 - 0.0000i 0.7099 - 0.0000i]
AP49 = [0.5833 - 0.0000i 0.8504 - 0.0000i 0.7943 - 0.0000i 0.7782 - 0.0000i 0.5094 - 0.0000i 0.5203 - 0.0000i 0.5198 - 0.0000i 0.5550 - 0.0000i 0.7326 - 0.0000i 0.7054 - 0.0000i]
AP50 = [0.5840 - 0.0000i 0.8487 - 0.0000i 0.7854 - 0.0000i 0.7764 - 0.0000i 0.5058 - 0.0000i 0.5178 - 0.0000i 0.5169 - 0.0000i 0.5513 - 0.0000i 0.7305 - 0.0000i 0.7006 - 0.0000i]
AP51 = [0.5847 - 0.0000i 0.8466 - 0.0000i 0.7758 - 0.0000i 0.7744 - 0.0000i 0.5021 - 0.0000i 0.5152 - 0.0000i 0.5139 - 0.0000i 0.5476 - 0.0000i 0.7281 - 0.0000i 0.6955 - 0.0000i]
AP52 = [0.5855 - 0.0000i 0.8441 - 0.0000i 0.7656 - 0.0000i 0.7722 - 0.0000i 0.4982 - 0.0000i 0.5124 - 0.0000i 0.5108 - 0.0000i 0.5436 - 0.0000i 0.7255 - 0.0000i 0.6900 - 0.0000i]
AP53 = [0.5862 - 0.0000i 0.8409 - 0.0000i 0.7547 - 0.0000i 0.7699 - 0.0000i 0.4941 - 0.0000i 0.5095 - 0.0000i 0.5075 - 0.0000i 0.5395 - 0.0000i 0.7226 - 0.0000i 0.6842 - 0.0000i]
AP54 = [0.5869 - 0.0000i 0.8371 - 0.0000i 0.7431 - 0.0000i 0.7673 - 0.0000i 0.4897 - 0.0000i 0.5064 - 0.0000i 0.5041 - 0.0000i 0.5353 - 0.0000i 0.7196 - 0.0000i 0.6780 - 0.0000i]
AP55 = [0.5876 - 0.0000i 0.8326 - 0.0000i 0.7308 - 0.0000i 0.7645 - 0.0000i 0.4852 - 0.0000i 0.5031 - 0.0000i 0.5005 - 0.0000i 0.5308 - 0.0000i 0.7162 - 0.0000i 0.6715 - 0.0000i]
AP56 = [0.5883 - 0.0000i 0.8273 - 0.0000i 0.7178 - 0.0000i 0.7615 - 0.0000i 0.4804 - 0.0000i 0.4997 - 0.0000i 0.4968 - 0.0000i 0.5262 - 0.0000i 0.7126 - 0.0000i 0.6645 - 0.0000i]
AP57 = [0.5888 - 0.0000i 0.8212 - 0.0000i 0.7040 - 0.0000i 0.7583 - 0.0000i 0.4755 - 0.0000i 0.4962 - 0.0000i 0.4929 - 0.0000i 0.5214 - 0.0000i 0.7088 - 0.0000i 0.6572 - 0.0000i]
AP58 = [0.5893 - 0.0000i 0.8140 - 0.0000i 0.6894 - 0.0000i 0.7549 - 0.0000i 0.4703 - 0.0000i 0.4925 - 0.0000i 0.4888 - 0.0000i 0.5164 - 0.0000i 0.7046 - 0.0000i 0.6495 - 0.0000i]
AP59 = [0.5897 - 0.0000i 0.8057 - 0.0000i 0.6741 - 0.0000i 0.7513 - 0.0000i 0.4649 - 0.0000i 0.4886 - 0.0000i 0.4846 - 0.0000i 0.5112 - 0.0000i 0.7001 - 0.0000i 0.6413 - 0.0000i]
AP60 = [0.5898 - 0.0000i 0.7962 - 0.0000i 0.6579 - 0.0000i 0.7475 - 0.0000i 0.4593 - 0.0000i 0.4845 - 0.0000i 0.4802 - 0.0000i 0.5058 - 0.0000i 0.6953 - 0.0000i 0.6327 - 0.0000i]
AP61 = [0.5898 - 0.0000i 0.7854 - 0.0000i 0.6410 - 0.0000i 0.7435 - 0.0000i 0.4536 - 0.0000i 0.4804 - 0.0000i 0.4756 - 0.0000i 0.5002 - 0.0000i 0.6902 - 0.0000i 0.6237 - 0.0000i]
AP62 = [0.5896 - 0.0000i 0.7732 - 0.0000i 0.6234 - 0.0000i 0.7393 - 0.0000i 0.4476 - 0.0000i 0.4761 - 0.0000i 0.4708 - 0.0000i 0.4944 - 0.0000i 0.6847 - 0.0000i 0.6142 - 0.0000i]

AP63 = [0.5890 - 0.0000i 0.7595 - 0.0000i 0.6051 - 0.0000i 0.7349 - 0.0000i 0.4416 - 0.0000i 0.4716 - 0.0000i 0.4659 - 0.0000i 0.4884 - 0.0000i 0.6790 - 0.0000i 0.6044 - 0.0000i]
AP64 = [0.5880 - 0.0000i 0.7442 - 0.0000i 0.5862 - 0.0000i 0.7304 - 0.0000i 0.4353 - 0.0000i 0.4670 - 0.0000i 0.4608 - 0.0000i 0.4823 - 0.0000i 0.6729 - 0.0000i 0.5942 - 0.0000i]
AP65 = [0.5866 - 0.0000i 0.7273 - 0.0000i 0.5666 - 0.0000i 0.7257 - 0.0000i 0.4289 - 0.0000i 0.4624 - 0.0000i 0.4556 - 0.0000i 0.4759 - 0.0000i 0.6665 - 0.0000i 0.5836 - 0.0000i]
AP66 = [0.5846 - 0.0000i 0.7087 - 0.0000i 0.5466 - 0.0000i 0.7208 - 0.0000i 0.4225 - 0.0000i 0.4576 - 0.0000i 0.4503 - 0.0000i 0.4694 - 0.0000i 0.6598 - 0.0000i 0.5727 - 0.0000i]
AP67 = [0.5820 - 0.0000i 0.6884 - 0.0000i 0.5262 - 0.0000i 0.7159 - 0.0000i 0.4160 - 0.0000i 0.4527 - 0.0000i 0.4448 - 0.0000i 0.4627 - 0.0000i 0.6528 - 0.0000i 0.5616 - 0.0000i]
AP68 = [0.5787 - 0.0000i 0.6665 - 0.0000i 0.5056 - 0.0000i 0.7109 - 0.0000i 0.4094 - 0.0000i 0.4478 - 0.0000i 0.4392 - 0.0000i 0.4558 - 0.0000i 0.6456 - 0.0000i 0.5502 - 0.0000i]
AP69 = [0.5745 - 0.0000i 0.6431 - 0.0000i 0.4848 - 0.0000i 0.7058 - 0.0000i 0.4028 - 0.0000i 0.4429 - 0.0000i 0.4335 - 0.0000i 0.4489 - 0.0000i 0.6381 - 0.0000i 0.5386 - 0.0000i]
AP70 = [0.5693 - 0.0000i 0.6184 - 0.0000i 0.4641 - 0.0000i 0.7007 - 0.0000i 0.3963 - 0.0000i 0.4380 - 0.0000i 0.4277 - 0.0000i 0.4418 - 0.0000i 0.6305 - 0.0000i 0.5269 - 0.0000i]
AP71 = [0.5631 - 0.0000i 0.5925 - 0.0000i 0.4435 - 0.0000i 0.6955 - 0.0000i 0.3898 - 0.0000i 0.4331 - 0.0000i 0.4220 - 0.0000i 0.4348 - 0.0000i 0.6227 - 0.0000i 0.5152 - 0.0000i]
AP72 = [0.5557 - 0.0000i 0.5657 - 0.0000i 0.4232 - 0.0000i 0.6904 - 0.0000i 0.3834 - 0.0000i 0.4283 - 0.0000i 0.4162 - 0.0000i 0.4276 - 0.0000i 0.6148 - 0.0000i 0.5035 - 0.0000i]
AP73 = [0.5471 - 0.0000i 0.5384 - 0.0000i 0.4034 - 0.0000i 0.6853 - 0.0000i 0.3772 - 0.0000i 0.4235 - 0.0000i 0.4104 - 0.0000i 0.4205 - 0.0000i 0.6070 - 0.0000i 0.4919 - 0.0000i]
AP74 = [0.5372 - 0.0000i 0.5108 - 0.0000i 0.3843 - 0.0000i 0.6804 - 0.0000i 0.3712 - 0.0000i 0.4189 - 0.0000i 0.4047 - 0.0000i 0.4135 - 0.0000i 0.5991 - 0.0000i 0.4805 - 0.0000i]
AP75 = [0.5261 - 0.0000i 0.4834 - 0.0000i 0.3659 - 0.0000i 0.6755 - 0.0000i 0.3654 - 0.0000i 0.4144 - 0.0000i 0.3990 - 0.0000i 0.4066 - 0.0000i 0.5913 - 0.0000i 0.4694 - 0.0000i]
AP76 = [0.5138 - 0.0000i 0.4565 - 0.0000i 0.3484 - 0.0000i 0.6708 - 0.0000i 0.3599 - 0.0000i 0.4101 - 0.0000i 0.3936 - 0.0000i 0.3998 - 0.0000i 0.5837 - 0.0000i 0.4587 - 0.0000i]
AP77 = [0.5005 - 0.0000i 0.4305 - 0.0000i 0.3319 - 0.0000i 0.6663 - 0.0000i 0.3547 - 0.0000i 0.4060 - 0.0000i 0.3882 - 0.0000i 0.3932 - 0.0000i 0.5763 - 0.0000i 0.4484 - 0.0000i]
AP78 = [0.4863 - 0.0000i 0.4057 - 0.0000i 0.3166 - 0.0000i 0.6620 - 0.0000i 0.3498 - 0.0000i 0.4021 - 0.0000i 0.3831 - 0.0000i 0.3869 - 0.0000i 0.5692 - 0.0000i 0.4386 - 0.0000i]
AP79 = [0.4715 - 0.0000i 0.3823 - 0.0000i 0.3024 - 0.0000i 0.6580 - 0.0000i 0.3453 - 0.0000i 0.3985 - 0.0000i 0.3783 - 0.0000i 0.3809 - 0.0000i 0.5624 - 0.0000i 0.4294 - 0.0000i]
AP80 = [0.4565 - 0.0000i 0.3607 - 0.0000i 0.2895 - 0.0000i 0.6542 - 0.0000i 0.3412 - 0.0000i 0.3951 - 0.0000i 0.3738 - 0.0000i 0.3753 - 0.0000i 0.5561 - 0.0000i 0.4208 - 0.0000i]
AP81 = [0.4415 - 0.0000i 0.3410 - 0.0000i 0.2779 - 0.0000i 0.6508 - 0.0000i 0.3374 - 0.0000i 0.3920 - 0.0000i 0.3695 - 0.0000i 0.3700 - 0.0000i 0.5501 - 0.0000i 0.4129 - 0.0000i]
AP82 = [0.4270 - 0.0000i 0.3233 - 0.0000i 0.2675 - 0.0000i 0.6476 - 0.0000i 0.3341 - 0.0000i 0.3893 - 0.0000i 0.3657 - 0.0000i 0.3652 - 0.0000i 0.5447 - 0.0000i 0.4058 - 0.0000i]
AP83 = [0.4132 - 0.0000i 0.3077 - 0.0000i 0.2585 - 0.0000i 0.6448 - 0.0000i 0.3311 - 0.0000i 0.3868 - 0.0000i 0.3622 - 0.0000i 0.3609 - 0.0000i 0.5399 - 0.0000i 0.3994 - 0.0000i]
AP84 = [0.4006 - 0.0000i 0.2942 - 0.0000i 0.2507 - 0.0000i 0.6423 - 0.0000i 0.3286 - 0.0000i 0.3847 - 0.0000i 0.3591 - 0.0000i 0.3571 - 0.0000i 0.5356 - 0.0000i 0.3938 - 0.0000i]
AP85 = [0.3895 - 0.0000i 0.2829 - 0.0000i 0.2442 - 0.0000i 0.6402 - 0.0000i 0.3264 - 0.0000i 0.3829 - 0.0000i 0.3565 - 0.0000i 0.3538 - 0.0000i 0.5319 - 0.0000i 0.3890 - 0.0000i]
AP86 = [0.3800 - 0.0000i 0.2737 - 0.0000i 0.2389 - 0.0000i 0.6385 - 0.0000i 0.3247 - 0.0000i 0.3814 - 0.0000i 0.3543 - 0.0000i 0.3511 - 0.0000i 0.5288 - 0.0000i 0.3851 - 0.0000i]
AP87 = [0.3724 - 0.0000i 0.2666 - 0.0000i 0.2348 - 0.0000i 0.6371 - 0.0000i 0.3234 - 0.0000i 0.3803 - 0.0000i 0.3526 - 0.0000i 0.3490 - 0.0000i 0.5264 - 0.0000i 0.3821 - 0.0000i]

AP88 = [0.3669 - 0.0000i 0.2616 - 0.0000i 0.2319 - 0.0000i 0.6361 - 0.0000i 0.3224 - 0.0000i 0.3795 - 0.0000i 0.3514 - 0.0000i 0.3474 - 0.0000i 0.5247 - 0.0000i 0.3799 - 0.0000i]
AP89 = [0.3636 - 0.0000i 0.2586 - 0.0000i 0.2302 - 0.0000i 0.6356 - 0.0000i 0.3218 - 0.0000i 0.3790 - 0.0000i 0.3507 - 0.0000i 0.3465 - 0.0000i 0.5237 - 0.0000i 0.3786 - 0.0000i]

Simulation values of Matlab for Sensor Structure 2

s-polarization values

RP1 = [0.8190 0.8456 0.1113 0.7097 0.7506 0.3521 0.4467 0.4937 0.5264 0.5577]
RP2 = [0.8197 0.8450 0.1118 0.7109 0.7497 0.3516 0.4466 0.4936 0.5263 0.5576]
RP3 = [0.8210 0.8442 0.1127 0.7129 0.7483 0.3508 0.4464 0.4935 0.5262 0.5574]
RP4 = [0.8227 0.8429 0.1140 0.7156 0.7462 0.3496 0.4461 0.4933 0.5260 0.5572]
RP5 = [0.8249 0.8413 0.1158 0.7190 0.7435 0.3481 0.4457 0.4930 0.5257 0.5568]
RP6 = [0.8276 0.8393 0.1184 0.7231 0.7402 0.3463 0.4453 0.4927 0.5253 0.5564]
RP7 = [0.8308 0.8368 0.1216 0.7278 0.7362 0.3442 0.4448 0.4923 0.5249 0.5559]
RP8 = [0.8344 0.8340 0.1259 0.7330 0.7315 0.3418 0.4442 0.4918 0.5245 0.5553]
RP9 = [0.8384 0.8306 0.1313 0.7388 0.7261 0.3392 0.4435 0.4913 0.5239 0.5547]
RP10 = [0.8428 0.8267 0.1381 0.7449 0.7199 0.3364 0.4428 0.4908 0.5234 0.5540]
RP11 = [0.8475 0.8223 0.1465 0.7514 0.7128 0.3334 0.4420 0.4902 0.5227 0.5532]
RP12 = [0.8527 0.8173 0.1567 0.7581 0.7050 0.3302 0.4412 0.4895 0.5220 0.5524]
RP13 = [0.8581 0.8116 0.1689 0.7649 0.6962 0.3269 0.4403 0.4888 0.5213 0.5515]
RP14 = [0.8638 0.8052 0.1835 0.7717 0.6865 0.3235 0.4394 0.4881 0.5205 0.5505]
RP15 = [0.8698 0.7980 0.2006 0.7785 0.6759 0.3200 0.4385 0.4873 0.5197 0.5495]
RP16 = [0.8759 0.7899 0.2203 0.7850 0.6644 0.3164 0.4375 0.4864 0.5188 0.5483]
RP17 = [0.8822 0.7808 0.2428 0.7912 0.6519 0.3129 0.4365 0.4856 0.5178 0.5472]
RP18 = [0.8886 0.7705 0.2681 0.7969 0.6383 0.3093 0.4354 0.4847 0.5168 0.5460]
RP19 = [0.8950 0.7590 0.2962 0.8021 0.6239 0.3058 0.4344 0.4837 0.5158 0.5447]
RP20 = [0.9014 0.7461 0.3267 0.8066 0.6084 0.3024 0.4333 0.4827 0.5147 0.5433]
RP21 = [0.9078 0.7315 0.3596 0.8104 0.5921 0.2990 0.4322 0.4817 0.5136 0.5420]
RP22 = [0.9141 0.7152 0.3943 0.8132 0.5748 0.2958 0.4311 0.4807 0.5125 0.5405]
RP23 = [0.9202 0.6968 0.4304 0.8152 0.5567 0.2926 0.4300 0.4797 0.5113 0.5390]
RP24 = [0.9260 0.6762 0.4674 0.8161 0.5379 0.2897 0.4289 0.4786 0.5101 0.5375]
RP25 = [0.9316 0.6531 0.5047 0.8159 0.5183 0.2869 0.4279 0.4775 0.5089 0.5359]
RP26 = [0.9367 0.6274 0.5416 0.8146 0.4982 0.2843 0.4268 0.4764 0.5076 0.5343]
RP27 = [0.9415 0.5988 0.5775 0.8121 0.4775 0.2818 0.4258 0.4753 0.5063 0.5327]
RP28 = [0.9457 0.5674 0.6120 0.8084 0.4565 0.2796 0.4248 0.4742 0.5050 0.5310]
RP29 = [0.9492 0.5334 0.6446 0.8034 0.4351 0.2776 0.4238 0.4731 0.5036 0.5292]
RP30 = [0.9521 0.4974 0.6748 0.7973 0.4136 0.2757 0.4228 0.4720 0.5023 0.5275]
RP31 = [0.9541 0.4605 0.7025 0.7900 0.3921 0.2741 0.4219 0.4708 0.5009 0.5257]
RP32 = [0.9551 0.4246 0.7274 0.7815 0.3706 0.2727 0.4209 0.4697 0.4995 0.5239]
RP33 = [0.9550 0.3924 0.7495 0.7719 0.3493 0.2715 0.4201 0.4686 0.4981 0.5221]
RP34 = [0.9535 0.3674 0.7687 0.7613 0.3283 0.2705 0.4192 0.4674 0.4967 0.5202]
RP35 = [0.9505 0.3534 0.7852 0.7496 0.3077 0.2697 0.4184 0.4663 0.4953 0.5183]
RP36 = [0.9457 0.3537 0.7989 0.7369 0.2876 0.2691 0.4177 0.4652 0.4939 0.5164]
RP37 = [0.9387 0.3700 0.8101 0.7234 0.2681 0.2687 0.4169 0.4641 0.4925 0.5145]
RP38 = [0.9291 0.4017 0.8189 0.7091 0.2493 0.2684 0.4162 0.4630 0.4910 0.5126]
RP39 = [0.9165 0.4458 0.8254 0.6941 0.2312 0.2683 0.4156 0.4619 0.4896 0.5107]

RP40 = [0.9002 0.4979 0.8300 0.6784 0.2139 0.2684 0.4150 0.4609 0.4882 0.5088]
RP41 = [0.8798 0.5530 0.8327 0.6622 0.1974 0.2687 0.4144 0.4598 0.4868 0.5069]
RP42 = [0.8545 0.6073 0.8338 0.6455 0.1819 0.2691 0.4139 0.4588 0.4854 0.5050]
RP43 = [0.8239 0.6578 0.8334 0.6284 0.1672 0.2696 0.4134 0.4578 0.4840 0.5031]
RP44 = [0.7876 0.7030 0.8317 0.6110 0.1535 0.2702 0.4129 0.4568 0.4826 0.5011]
RP45 = [0.7459 0.7424 0.8288 0.5934 0.1406 0.2710 0.4125 0.4558 0.4812 0.4992]
RP46 = [0.7000 0.7760 0.8249 0.5756 0.1287 0.2719 0.4121 0.4549 0.4798 0.4973]
RP47 = [0.6522 0.8043 0.8200 0.5577 0.1177 0.2729 0.4118 0.4539 0.4785 0.4955]
RP48 = [0.6062 0.8279 0.8144 0.5398 0.1076 0.2739 0.4114 0.4530 0.4772 0.4936]
RP49 = [0.5667 0.8474 0.8081 0.5220 0.0984 0.2751 0.4112 0.4522 0.4758 0.4917]
RP50 = [0.5381 0.8635 0.8013 0.5043 0.0900 0.2763 0.4109 0.4513 0.4745 0.4899]
RP51 = [0.5236 0.8767 0.7939 0.4868 0.0824 0.2776 0.4107 0.4505 0.4733 0.4881]
RP52 = [0.5239 0.8875 0.7861 0.4695 0.0756 0.2789 0.4105 0.4496 0.4720 0.4863]
RP53 = [0.5370 0.8962 0.7779 0.4524 0.0695 0.2803 0.4103 0.4489 0.4708 0.4846]
RP54 = [0.5599 0.9033 0.7694 0.4357 0.0641 0.2817 0.4102 0.4481 0.4696 0.4828]
RP55 = [0.5887 0.9089 0.7608 0.4193 0.0593 0.2831 0.4101 0.4474 0.4684 0.4811]
RP56 = [0.6203 0.9134 0.7519 0.4034 0.0552 0.2846 0.4100 0.4466 0.4672 0.4794]
RP57 = [0.6521 0.9168 0.7429 0.3878 0.0516 0.2861 0.4100 0.4459 0.4661 0.4778]
RP58 = [0.6827 0.9195 0.7338 0.3727 0.0485 0.2876 0.4099 0.4453 0.4650 0.4762]
RP59 = [0.7111 0.9214 0.7247 0.3581 0.0460 0.2891 0.4099 0.4446 0.4639 0.4746]
RP60 = [0.7370 0.9228 0.7155 0.3440 0.0438 0.2907 0.4099 0.4440 0.4629 0.4731]
RP61 = [0.7602 0.9236 0.7064 0.3303 0.0421 0.2922 0.4099 0.4434 0.4619 0.4716]
RP62 = [0.7809 0.9241 0.6973 0.3172 0.0407 0.2937 0.4099 0.4429 0.4609 0.4701]
RP63 = [0.7992 0.9242 0.6883 0.3046 0.0397 0.2951 0.4100 0.4423 0.4600 0.4687]
RP64 = [0.8154 0.9240 0.6795 0.2926 0.0390 0.2966 0.4100 0.4418 0.4590 0.4673]
RP65 = [0.8298 0.9236 0.6708 0.2811 0.0385 0.2981 0.4101 0.4413 0.4581 0.4660]
RP66 = [0.8424 0.9230 0.6622 0.2701 0.0383 0.2995 0.4102 0.4408 0.4573 0.4647]
RP67 = [0.8535 0.9222 0.6539 0.2597 0.0383 0.3009 0.4102 0.4404 0.4565 0.4634]
RP68 = [0.8634 0.9213 0.6457 0.2497 0.0385 0.3022 0.4103 0.4399 0.4557 0.4622]
RP69 = [0.8721 0.9202 0.6378 0.2404 0.0388 0.3035 0.4104 0.4395 0.4549 0.4611]
RP70 = [0.8798 0.9191 0.6302 0.2315 0.0392 0.3048 0.4105 0.4391 0.4542 0.4600]
RP71 = [0.8866 0.9180 0.6228 0.2232 0.0398 0.3060 0.4106 0.4388 0.4535 0.4589]
RP72 = [0.8927 0.9168 0.6157 0.2154 0.0404 0.3072 0.4107 0.4384 0.4529 0.4579]
RP73 = [0.8980 0.9155 0.6089 0.2080 0.0412 0.3083 0.4108 0.4381 0.4522 0.4570]
RP74 = [0.9028 0.9143 0.6024 0.2012 0.0419 0.3094 0.4109 0.4378 0.4517 0.4561]
RP75 = [0.9070 0.9131 0.5963 0.1949 0.0427 0.3104 0.4110 0.4375 0.4511 0.4552]
RP76 = [0.9107 0.9119 0.5905 0.1890 0.0435 0.3113 0.4111 0.4373 0.4506 0.4544]
RP77 = [0.9140 0.9108 0.5850 0.1835 0.0443 0.3123 0.4112 0.4370 0.4501 0.4537]
RP78 = [0.9169 0.9096 0.5799 0.1786 0.0451 0.3131 0.4113 0.4368 0.4497 0.4530]
RP79 = [0.9195 0.9086 0.5752 0.1740 0.0459 0.3139 0.4114 0.4366 0.4493 0.4523]
RP80 = [0.9217 0.9076 0.5709 0.1699 0.0466 0.3146 0.4115 0.4364 0.4489 0.4517]
RP81 = [0.9237 0.9067 0.5670 0.1662 0.0473 0.3152 0.4116 0.4362 0.4485 0.4512]
RP82 = [0.9254 0.9058 0.5634 0.1630 0.0479 0.3158 0.4116 0.4361 0.4482 0.4507]
RP83 = [0.9268 0.9051 0.5603 0.1601 0.0485 0.3164 0.4117 0.4360 0.4480 0.4503]
RP84 = [0.9280 0.9044 0.5575 0.1576 0.0490 0.3168 0.4118 0.4358 0.4477 0.4500]
RP85 = [0.9290 0.9038 0.5552 0.1556 0.0495 0.3172 0.4118 0.4358 0.4475 0.4496]
RP86 = [0.9299 0.9034 0.5533 0.1539 0.0499 0.3175 0.4118 0.4357 0.4474 0.4494]
RP87 = [0.9305 0.9030 0.5518 0.1526 0.0502 0.3178 0.4119 0.4356 0.4473 0.4492]
RP88 = [0.9309 0.9027 0.5508 0.1516 0.0504 0.3179 0.4119 0.4356 0.4472 0.4491]
RP89 = [0.9312 0.9026 0.5501 0.1511 0.0505 0.3180 0.4119 0.4355 0.4471 0.4490]

AP1 = [0.1810 - 0.0000i 0.1544 - 0.0000i 0.8887 - 0.0000i 0.2903 - 0.0000i 0.2494 - 0.0000i 0.6479 - 0.0000i 0.5533 - 0.0000i 0.5063 - 0.0000i 0.4736 - 0.0000i 0.4423 - 0.0000i]
AP2 = [0.1803 - 0.0000i 0.1550 - 0.0000i 0.8882 - 0.0000i 0.2891 - 0.0000i 0.2503 - 0.0000i 0.6484 - 0.0000i 0.5534 - 0.0000i 0.5064 - 0.0000i 0.4737 - 0.0000i 0.4424 - 0.0000i]
AP3 = [0.1790 - 0.0000i 0.1558 - 0.0000i 0.8873 - 0.0000i 0.2871 - 0.0000i 0.2517 - 0.0000i 0.6492 - 0.0000i 0.5536 - 0.0000i 0.5065 - 0.0000i 0.4738 - 0.0000i 0.4426 - 0.0000i]
AP4 = [0.1773 - 0.0000i 0.1571 - 0.0000i 0.8860 - 0.0000i 0.2844 - 0.0000i 0.2538 - 0.0000i 0.6504 - 0.0000i 0.5539 - 0.0000i 0.5067 - 0.0000i 0.4740 - 0.0000i 0.4428 - 0.0000i]
AP5 = [0.1751 - 0.0000i 0.1587 - 0.0000i 0.8842 - 0.0000i 0.2810 - 0.0000i 0.2565 - 0.0000i 0.6519 - 0.0000i 0.5543 - 0.0000i 0.5070 - 0.0000i 0.4743 - 0.0000i 0.4432 - 0.0000i]
AP6 = [0.1724 - 0.0000i 0.1607 - 0.0000i 0.8816 - 0.0000i 0.2769 - 0.0000i 0.2598 - 0.0000i 0.6537 - 0.0000i 0.5547 - 0.0000i 0.5073 - 0.0000i 0.4747 - 0.0000i 0.4436 - 0.0000i]
AP7 = [0.1692 - 0.0000i 0.1632 - 0.0000i 0.8783 - 0.0000i 0.2722 - 0.0000i 0.2638 - 0.0000i 0.6558 - 0.0000i 0.5552 - 0.0000i 0.5077 - 0.0000i 0.4751 - 0.0000i 0.4441 - 0.0000i]
AP8 = [0.1656 - 0.0000i 0.1660 - 0.0000i 0.8741 - 0.0000i 0.2670 - 0.0000i 0.2685 - 0.0000i 0.6582 - 0.0000i 0.5558 - 0.0000i 0.5082 - 0.0000i 0.4755 - 0.0000i 0.4447 - 0.0000i]
AP9 = [0.1616 - 0.0000i 0.1694 - 0.0000i 0.8687 - 0.0000i 0.2612 - 0.0000i 0.2739 - 0.0000i 0.6608 - 0.0000i 0.5565 - 0.0000i 0.5087 - 0.0000i 0.4761 - 0.0000i 0.4453 - 0.0000i]
AP10 = [0.1572 - 0.0000i 0.1733 - 0.0000i 0.8619 - 0.0000i 0.2551 - 0.0000i 0.2801 - 0.0000i 0.6636 - 0.0000i 0.5572 - 0.0000i 0.5092 - 0.0000i 0.4766 - 0.0000i 0.4460 - 0.0000i]
AP11 = [0.1524 - 0.0000i 0.1777 - 0.0000i 0.8535 - 0.0000i 0.2486 - 0.0000i 0.2872 - 0.0000i 0.6666 - 0.0000i 0.5580 - 0.0000i 0.5098 - 0.0000i 0.4773 - 0.0000i 0.4468 - 0.0000i]
AP12 = [0.1473 - 0.0000i 0.1827 - 0.0000i 0.8433 - 0.0000i 0.2419 - 0.0000i 0.2950 - 0.0000i 0.6698 - 0.0000i 0.5588 - 0.0000i 0.5105 - 0.0000i 0.4780 - 0.0000i 0.4476 - 0.0000i]
AP13 = [0.1419 - 0.0000i 0.1884 - 0.0000i 0.8311 - 0.0000i 0.2351 - 0.0000i 0.3038 - 0.0000i 0.6731 - 0.0000i 0.5597 - 0.0000i 0.5112 - 0.0000i 0.4787 - 0.0000i 0.4485 - 0.0000i]
AP14 = [0.1362 - 0.0000i 0.1948 - 0.0000i 0.8165 - 0.0000i 0.2283 - 0.0000i 0.3135 - 0.0000i 0.6765 - 0.0000i 0.5606 - 0.0000i 0.5119 - 0.0000i 0.4795 - 0.0000i 0.4495 - 0.0000i]
AP15 = [0.1302 - 0.0000i 0.2020 - 0.0000i 0.7994 - 0.0000i 0.2215 - 0.0000i 0.3241 - 0.0000i 0.6800 - 0.0000i 0.5615 - 0.0000i 0.5127 - 0.0000i 0.4803 - 0.0000i 0.4505 - 0.0000i]
AP16 = [0.1241 - 0.0000i 0.2101 - 0.0000i 0.7797 - 0.0000i 0.2150 - 0.0000i 0.3356 - 0.0000i 0.6836 - 0.0000i 0.5625 - 0.0000i 0.5136 - 0.0000i 0.4812 - 0.0000i 0.4517 - 0.0000i]
AP17 = [0.1178 - 0.0000i 0.2192 - 0.0000i 0.7572 - 0.0000i 0.2088 - 0.0000i 0.3481 - 0.0000i 0.6871 - 0.0000i 0.5635 - 0.0000i 0.5144 - 0.0000i 0.4822 - 0.0000i 0.4528 - 0.0000i]
AP18 = [0.1114 - 0.0000i 0.2295 - 0.0000i 0.7319 - 0.0000i 0.2031 - 0.0000i 0.3617 - 0.0000i 0.6907 - 0.0000i 0.5646 - 0.0000i 0.5153 - 0.0000i 0.4832 - 0.0000i 0.4540 - 0.0000i]
AP19 = [0.1050 - 0.0000i 0.2410 - 0.0000i 0.7038 - 0.0000i 0.1979 - 0.0000i 0.3761 - 0.0000i 0.6942 - 0.0000i 0.5656 - 0.0000i 0.5163 - 0.0000i 0.4842 - 0.0000i 0.4553 - 0.0000i]
AP20 = [0.0986 - 0.0000i 0.2539 - 0.0000i 0.6733 - 0.0000i 0.1934 - 0.0000i 0.3916 - 0.0000i 0.6976 - 0.0000i 0.5667 - 0.0000i 0.5173 - 0.0000i 0.4853 - 0.0000i 0.4567 - 0.0000i]
AP21 = [0.0922 - 0.0000i 0.2685 - 0.0000i 0.6404 - 0.0000i 0.1896 - 0.0000i 0.4079 - 0.0000i 0.7010 - 0.0000i 0.5678 - 0.0000i 0.5183 - 0.0000i 0.4864 - 0.0000i 0.4580 - 0.0000i]
AP22 = [0.0859 - 0.0000i 0.2848 - 0.0000i 0.6057 - 0.0000i 0.1868 - 0.0000i 0.4252 - 0.0000i 0.7042 - 0.0000i 0.5689 - 0.0000i 0.5193 - 0.0000i 0.4875 - 0.0000i 0.4595 - 0.0000i]
AP23 = [0.0798 - 0.0000i 0.3032 - 0.0000i 0.5696 - 0.0000i 0.1848 - 0.0000i 0.4433 - 0.0000i 0.7074 - 0.0000i 0.5700 - 0.0000i 0.5203 - 0.0000i 0.4887 - 0.0000i 0.4610 - 0.0000i]
AP24 = [0.0740 - 0.0000i 0.3238 - 0.0000i 0.5326 - 0.0000i 0.1839 - 0.0000i 0.4621 - 0.0000i 0.7103 - 0.0000i 0.5711 - 0.0000i 0.5214 - 0.0000i 0.4899 - 0.0000i 0.4625 - 0.0000i]

AP25 = [0.0684 - 0.0000i   0.3469 - 0.0000i   0.4953 - 0.0000i   0.1841 - 0.0000i   0.4817 - 0.0000i   0.7131 - 0.0000i   0.5721 - 0.0000i   0.5225 - 0.0000i 0.4911 - 0.0000i   0.4641 - 0.0000i]
AP26 = [0.0633 - 0.0000i   0.3726 - 0.0000i   0.4584 - 0.0000i   0.1854 - 0.0000i   0.5018 - 0.0000i   0.7157 - 0.0000i   0.5732 - 0.0000i   0.5236 - 0.0000i 0.4924 - 0.0000i   0.4657 - 0.0000i]
AP27 = [0.0585 - 0.0000i   0.4012 - 0.0000i   0.4225 - 0.0000i   0.1879 - 0.0000i   0.5225 - 0.0000i   0.7182 - 0.0000i   0.5742 - 0.0000i   0.5247 - 0.0000i 0.4937 - 0.0000i   0.4673 - 0.0000i]
AP28 = [0.0543 - 0.0000i   0.4326 - 0.0000i   0.3880 - 0.0000i   0.1916 - 0.0000i   0.5435 - 0.0000i   0.7204 - 0.0000i   0.5752 - 0.0000i   0.5258 - 0.0000i 0.4950 - 0.0000i   0.4690 - 0.0000i]
AP29 = [0.0508 - 0.0000i   0.4666 - 0.0000i   0.3554 - 0.0000i   0.1966 - 0.0000i   0.5649 - 0.0000i   0.7224 - 0.0000i   0.5762 - 0.0000i   0.5269 - 0.0000i 0.4964 - 0.0000i   0.4708 - 0.0000i]
AP30 = [0.0479 - 0.0000i   0.5026 - 0.0000i   0.3252 - 0.0000i   0.2027 - 0.0000i   0.5864 - 0.0000i   0.7243 - 0.0000i   0.5772 - 0.0000i   0.5280 - 0.0000i 0.4977 - 0.0000i   0.4725 - 0.0000i]
AP31 = [0.0459 - 0.0000i   0.5395 - 0.0000i   0.2975 - 0.0000i   0.2100 - 0.0000i   0.6079 - 0.0000i   0.7259 - 0.0000i   0.5781 - 0.0000i   0.5292 - 0.0000i 0.4991 - 0.0000i   0.4743 - 0.0000i]
AP32 = [0.0449 - 0.0000i   0.5754 - 0.0000i   0.2726 - 0.0000i   0.2185 - 0.0000i   0.6294 - 0.0000i   0.7273 - 0.0000i   0.5791 - 0.0000i   0.5303 - 0.0000i 0.5005 - 0.0000i   0.4761 - 0.0000i]
AP33 = [0.0450 - 0.0000i   0.6076 - 0.0000i   0.2505 - 0.0000i   0.2281 - 0.0000i   0.6507 - 0.0000i   0.7285 - 0.0000i   0.5799 - 0.0000i   0.5314 - 0.0000i 0.5019 - 0.0000i   0.4779 - 0.0000i]
AP34 = [0.0465 - 0.0000i   0.6326 - 0.0000i   0.2313 - 0.0000i   0.2387 - 0.0000i   0.6717 - 0.0000i   0.7295 - 0.0000i   0.5808 - 0.0000i   0.5326 - 0.0000i 0.5033 - 0.0000i   0.4798 - 0.0000i]
AP35 = [0.0495 - 0.0000i   0.6466 - 0.0000i   0.2148 - 0.0000i   0.2504 - 0.0000i   0.6923 - 0.0000i   0.7303 - 0.0000i   0.5816 - 0.0000i   0.5337 - 0.0000i 0.5047 - 0.0000i   0.4817 - 0.0000i]
AP36 = [0.0543 - 0.0000i   0.6463 - 0.0000i   0.2011 - 0.0000i   0.2631 - 0.0000i   0.7124 - 0.0000i   0.7309 - 0.0000i   0.5823 - 0.0000i   0.5348 - 0.0000i 0.5061 - 0.0000i   0.4836 - 0.0000i]
AP37 = [0.0613 - 0.0000i   0.6300 - 0.0000i   0.1899 - 0.0000i   0.2766 - 0.0000i   0.7319 - 0.0000i   0.7313 - 0.0000i   0.5831 - 0.0000i   0.5359 - 0.0000i 0.5075 - 0.0000i   0.4855 - 0.0000i]
AP38 = [0.0709 - 0.0000i   0.5983 - 0.0000i   0.1811 - 0.0000i   0.2909 - 0.0000i   0.7507 - 0.0000i   0.7316 - 0.0000i   0.5838 - 0.0000i   0.5370 - 0.0000i 0.5090 - 0.0000i   0.4874 - 0.0000i]
AP39 = [0.0835 - 0.0000i   0.5542 - 0.0000i   0.1746 - 0.0000i   0.3059 - 0.0000i   0.7688 - 0.0000i   0.7317 - 0.0000i   0.5844 - 0.0000i   0.5381 - 0.0000i 0.5104 - 0.0000i   0.4893 - 0.0000i]
AP40 = [0.0998 - 0.0000i   0.5021 - 0.0000i   0.1700 - 0.0000i   0.3216 - 0.0000i   0.7861 - 0.0000i   0.7316 - 0.0000i   0.5850 - 0.0000i   0.5391 - 0.0000i 0.5118 - 0.0000i   0.4912 - 0.0000i]
AP41 = [0.1202 - 0.0000i   0.4470 - 0.0000i   0.1673 - 0.0000i   0.3378 - 0.0000i   0.8026 - 0.0000i   0.7313 - 0.0000i   0.5856 - 0.0000i   0.5402 - 0.0000i 0.5132 - 0.0000i   0.4931 - 0.0000i]
AP42 = [0.1455 - 0.0000i   0.3927 - 0.0000i   0.1662 - 0.0000i   0.3545 - 0.0000i   0.8181 - 0.0000i   0.7309 - 0.0000i   0.5861 - 0.0000i   0.5412 - 0.0000i 0.5146 - 0.0000i   0.4950 - 0.0000i]
AP43 = [0.1761 - 0.0000i   0.3422 - 0.0000i   0.1666 - 0.0000i   0.3716 - 0.0000i   0.8328 - 0.0000i   0.7304 - 0.0000i   0.5866 - 0.0000i   0.5422 - 0.0000i 0.5160 - 0.0000i   0.4969 - 0.0000i]
AP44 = [0.2124 - 0.0000i   0.2970 - 0.0000i   0.1683 - 0.0000i   0.3890 - 0.0000i   0.8465 - 0.0000i   0.7298 - 0.0000i   0.5871 - 0.0000i   0.5432 - 0.0000i 0.5174 - 0.0000i   0.4989 - 0.0000i]
AP45 = [0.2541 - 0.0000i   0.2576 - 0.0000i   0.1712 - 0.0000i   0.4066 - 0.0000i   0.8594 - 0.0000i   0.7290 - 0.0000i   0.5875 - 0.0000i   0.5442 - 0.0000i 0.5188 - 0.0000i   0.5008 - 0.0000i]
AP46 = [0.3000 - 0.0000i   0.2240 - 0.0000i   0.1751 - 0.0000i   0.4244 - 0.0000i   0.8713 - 0.0000i   0.7281 - 0.0000i   0.5879 - 0.0000i   0.5451 - 0.0000i 0.5202 - 0.0000i   0.5027 - 0.0000i]
AP47 = [0.3478 - 0.0000i   0.1957 - 0.0000i   0.1800 - 0.0000i   0.4423 - 0.0000i   0.8823 - 0.0000i   0.7271 - 0.0000i   0.5882 - 0.0000i   0.5461 - 0.0000i 0.5215 - 0.0000i   0.5045 - 0.0000i]
AP48 = [0.3938 - 0.0000i   0.1721 - 0.0000i   0.1856 - 0.0000i   0.4602 - 0.0000i   0.8924 - 0.0000i   0.7261 - 0.0000i   0.5886 - 0.0000i   0.5470 - 0.0000i 0.5228 - 0.0000i   0.5064 - 0.0000i]
AP49 = [0.4333 - 0.0000i   0.1526 - 0.0000i   0.1919 - 0.0000i   0.4780 - 0.0000i   0.9016 - 0.0000i   0.7249 - 0.0000i   0.5888 - 0.0000i   0.5478 - 0.0000i 0.5242 - 0.0000i   0.5083 - 0.0000i]

AP50 = [0.4619 - 0.0000i 0.1365 - 0.0000i 0.1987 - 0.0000i 0.4957 - 0.0000i 0.9100 - 0.0000i 0.7237 - 0.0000i 0.5891 - 0.0000i 0.5487 - 0.0000i 0.5255 - 0.0000i 0.5101 - 0.0000i]
AP51 = [0.4764 - 0.0000i 0.1233 - 0.0000i 0.2061 - 0.0000i 0.5132 - 0.0000i 0.9176 - 0.0000i 0.7224 - 0.0000i 0.5893 - 0.0000i 0.5495 - 0.0000i 0.5267 - 0.0000i 0.5119 - 0.0000i]
AP52 = [0.4761 - 0.0000i 0.1125 - 0.0000i 0.2139 - 0.0000i 0.5305 - 0.0000i 0.9244 - 0.0000i 0.7211 - 0.0000i 0.5895 - 0.0000i 0.5504 - 0.0000i 0.5280 - 0.0000i 0.5137 - 0.0000i]
AP53 = [0.4630 - 0.0000i 0.1038 - 0.0000i 0.2221 - 0.0000i 0.5476 - 0.0000i 0.9305 - 0.0000i 0.7197 - 0.0000i 0.5897 - 0.0000i 0.5511 - 0.0000i 0.5292 - 0.0000i 0.5154 - 0.0000i]
AP54 = [0.4401 - 0.0000i 0.0967 - 0.0000i 0.2306 - 0.0000i 0.5643 - 0.0000i 0.9359 - 0.0000i 0.7183 - 0.0000i 0.5898 - 0.0000i 0.5519 - 0.0000i 0.5304 - 0.0000i 0.5172 - 0.0000i]
AP55 = [0.4113 - 0.0000i 0.0911 - 0.0000i 0.2392 - 0.0000i 0.5807 - 0.0000i 0.9407 - 0.0000i 0.7169 - 0.0000i 0.5899 - 0.0000i 0.5526 - 0.0000i 0.5316 - 0.0000i 0.5189 - 0.0000i]
AP56 = [0.3797 - 0.0000i 0.0866 - 0.0000i 0.2481 - 0.0000i 0.5966 - 0.0000i 0.9448 - 0.0000i 0.7154 - 0.0000i 0.5900 - 0.0000i 0.5534 - 0.0000i 0.5328 - 0.0000i 0.5206 - 0.0000i]
AP57 = [0.3479 - 0.0000i 0.0832 - 0.0000i 0.2571 - 0.0000i 0.6122 - 0.0000i 0.9484 - 0.0000i 0.7139 - 0.0000i 0.5900 - 0.0000i 0.5541 - 0.0000i 0.5339 - 0.0000i 0.5222 - 0.0000i]
AP58 = [0.3173 - 0.0000i 0.0805 - 0.0000i 0.2662 - 0.0000i 0.6273 - 0.0000i 0.9515 - 0.0000i 0.7124 - 0.0000i 0.5901 - 0.0000i 0.5547 - 0.0000i 0.5350 - 0.0000i 0.5238 - 0.0000i]
AP59 = [0.2889 - 0.0000i 0.0786 - 0.0000i 0.2753 - 0.0000i 0.6419 - 0.0000i 0.9540 - 0.0000i 0.7109 - 0.0000i 0.5901 - 0.0000i 0.5554 - 0.0000i 0.5361 - 0.0000i 0.5254 - 0.0000i]
AP60 = [0.2630 - 0.0000i 0.0772 - 0.0000i 0.2845 - 0.0000i 0.6560 - 0.0000i 0.9562 - 0.0000i 0.7093 - 0.0000i 0.5901 - 0.0000i 0.5560 - 0.0000i 0.5371 - 0.0000i 0.5269 - 0.0000i]
AP61 = [0.2398 - 0.0000i 0.0764 - 0.0000i 0.2936 - 0.0000i 0.6697 - 0.0000i 0.9579 - 0.0000i 0.7078 - 0.0000i 0.5901 - 0.0000i 0.5566 - 0.0000i 0.5381 - 0.0000i 0.5284 - 0.0000i]
AP62 = [0.2191 - 0.0000i 0.0759 - 0.0000i 0.3027 - 0.0000i 0.6828 - 0.0000i 0.9593 - 0.0000i 0.7063 - 0.0000i 0.5901 - 0.0000i 0.5571 - 0.0000i 0.5391 - 0.0000i 0.5299 - 0.0000i]
AP63 = [0.2008 - 0.0000i 0.0758 - 0.0000i 0.3117 - 0.0000i 0.6954 - 0.0000i 0.9603 - 0.0000i 0.7049 - 0.0000i 0.5900 - 0.0000i 0.5577 - 0.0000i 0.5400 - 0.0000i 0.5313 - 0.0000i]
AP64 = [0.1846 - 0.0000i 0.0760 - 0.0000i 0.3205 - 0.0000i 0.7074 - 0.0000i 0.9610 - 0.0000i 0.7034 - 0.0000i 0.5900 - 0.0000i 0.5582 - 0.0000i 0.5410 - 0.0000i 0.5327 - 0.0000i]
AP65 = [0.1702 - 0.0000i 0.0764 - 0.0000i 0.3292 - 0.0000i 0.7189 - 0.0000i 0.9615 - 0.0000i 0.7019 - 0.0000i 0.5899 - 0.0000i 0.5587 - 0.0000i 0.5419 - 0.0000i 0.5340 - 0.0000i]
AP66 = [0.1576 - 0.0000i 0.0770 - 0.0000i 0.3378 - 0.0000i 0.7299 - 0.0000i 0.9617 - 0.0000i 0.7005 - 0.0000i 0.5898 - 0.0000i 0.5592 - 0.0000i 0.5427 - 0.0000i 0.5353 - 0.0000i]
AP67 = [0.1465 - 0.0000i 0.0778 - 0.0000i 0.3461 - 0.0000i 0.7403 - 0.0000i 0.9617 - 0.0000i 0.6991 - 0.0000i 0.5898 - 0.0000i 0.5596 - 0.0000i 0.5435 - 0.0000i 0.5366 - 0.0000i]
AP68 = [0.1366 - 0.0000i 0.0787 - 0.0000i 0.3543 - 0.0000i 0.7503 - 0.0000i 0.9615 - 0.0000i 0.6978 - 0.0000i 0.5897 - 0.0000i 0.5601 - 0.0000i 0.5443 - 0.0000i 0.5378 - 0.0000i]
AP69 = [0.1279 - 0.0000i 0.0798 - 0.0000i 0.3622 - 0.0000i 0.7596 - 0.0000i 0.9612 - 0.0000i 0.6965 - 0.0000i 0.5896 - 0.0000i 0.5605 - 0.0000i 0.5451 - 0.0000i 0.5389 - 0.0000i]
AP70 = [0.1202 - 0.0000i 0.0809 - 0.0000i 0.3698 - 0.0000i 0.7685 - 0.0000i 0.9608 - 0.0000i 0.6952 - 0.0000i 0.5895 - 0.0000i 0.5609 - 0.0000i 0.5458 - 0.0000i 0.5400 - 0.0000i]
AP71 = [0.1134 - 0.0000i 0.0820 - 0.0000i 0.3772 - 0.0000i 0.7768 - 0.0000i 0.9602 - 0.0000i 0.6940 - 0.0000i 0.5894 - 0.0000i 0.5612 - 0.0000i 0.5465 - 0.0000i 0.5411 - 0.0000i]
AP72 = [0.1073 - 0.0000i 0.0832 - 0.0000i 0.3843 - 0.0000i 0.7846 - 0.0000i 0.9596 - 0.0000i 0.6928 - 0.0000i 0.5893 - 0.0000i 0.5616 - 0.0000i 0.5471 - 0.0000i 0.5421 - 0.0000i]
AP73 = [0.1020 - 0.0000i 0.0845 - 0.0000i 0.3911 - 0.0000i 0.7920 - 0.0000i 0.9588 - 0.0000i 0.6917 - 0.0000i 0.5892 - 0.0000i 0.5619 - 0.0000i 0.5478 - 0.0000i 0.5430 - 0.0000i]
AP74 = [0.0972 - 0.0000i 0.0857 - 0.0000i 0.3976 - 0.0000i 0.7988 - 0.0000i 0.9581 - 0.0000i 0.6906 - 0.0000i 0.5891 - 0.0000i 0.5622 - 0.0000i 0.5483 - 0.0000i 0.5439 - 0.0000i]

AP75 = [0.0930 - 0.0000i   0.0869 - 0.0000i   0.4037 - 0.0000i   0.8051 - 0.0000i   0.9573 - 0.0000i   0.6896 - 0.0000i   0.5890 - 0.0000i   0.5625 - 0.0000i 0.5489 - 0.0000i   0.5448 - 0.0000i]
AP76 = [0.0893 - 0.0000i   0.0881 - 0.0000i   0.4095 - 0.0000i   0.8110 - 0.0000i   0.9565 - 0.0000i   0.6887 - 0.0000i   0.5889 - 0.0000i   0.5627 - 0.0000i 0.5494 - 0.0000i   0.5456 - 0.0000i]
AP77 = [0.0860 - 0.0000i   0.0892 - 0.0000i   0.4150 - 0.0000i   0.8165 - 0.0000i   0.9557 - 0.0000i   0.6877 - 0.0000i   0.5888 - 0.0000i   0.5630 - 0.0000i 0.5499 - 0.0000i   0.5463 - 0.0000i]
AP78 = [0.0831 - 0.0000i   0.0904 - 0.0000i   0.4201 - 0.0000i   0.8214 - 0.0000i   0.9549 - 0.0000i   0.6869 - 0.0000i   0.5887 - 0.0000i   0.5632 - 0.0000i 0.5503 - 0.0000i   0.5470 - 0.0000i]
AP79 = [0.0805 - 0.0000i   0.0914 - 0.0000i   0.4248 - 0.0000i   0.8260 - 0.0000i   0.9541 - 0.0000i   0.6861 - 0.0000i   0.5886 - 0.0000i   0.5634 - 0.0000i 0.5507 - 0.0000i   0.5477 - 0.0000i]
AP80 = [0.0783 - 0.0000i   0.0924 - 0.0000i   0.4291 - 0.0000i   0.8301 - 0.0000i   0.9534 - 0.0000i   0.6854 - 0.0000i   0.5885 - 0.0000i   0.5636 - 0.0000i 0.5511 - 0.0000i   0.5483 - 0.0000i]
AP81 = [0.0763 - 0.0000i   0.0933 - 0.0000i   0.4330 - 0.0000i   0.8338 - 0.0000i   0.9527 - 0.0000i   0.6848 - 0.0000i   0.5884 - 0.0000i   0.5638 - 0.0000i 0.5515 - 0.0000i   0.5488 - 0.0000i]
AP82 = [0.0746 - 0.0000i   0.0942 - 0.0000i   0.4366 - 0.0000i   0.8370 - 0.0000i   0.9521 - 0.0000i   0.6842 - 0.0000i   0.5884 - 0.0000i   0.5639 - 0.0000i 0.5518 - 0.0000i   0.5493 - 0.0000i]
AP83 = [0.0732 - 0.0000i   0.0949 - 0.0000i   0.4397 - 0.0000i   0.8399 - 0.0000i   0.9515 - 0.0000i   0.6836 - 0.0000i   0.5883 - 0.0000i   0.5640 - 0.0000i 0.5520 - 0.0000i   0.5497 - 0.0000i]
AP84 = [0.0720 - 0.0000i   0.0956 - 0.0000i   0.4425 - 0.0000i   0.8424 - 0.0000i   0.9510 - 0.0000i   0.6832 - 0.0000i   0.5882 - 0.0000i   0.5642 - 0.0000i 0.5523 - 0.0000i   0.5500 - 0.0000i]
AP85 = [0.0710 - 0.0000i   0.0962 - 0.0000i   0.4448 - 0.0000i   0.8444 - 0.0000i   0.9505 - 0.0000i   0.6828 - 0.0000i   0.5882 - 0.0000i   0.5642 - 0.0000i 0.5525 - 0.0000i   0.5504 - 0.0000i]
AP86 = [0.0701 - 0.0000i   0.0966 - 0.0000i   0.4467 - 0.0000i   0.8461 - 0.0000i   0.9501 - 0.0000i   0.6825 - 0.0000i   0.5882 - 0.0000i   0.5643 - 0.0000i 0.5526 - 0.0000i   0.5506 - 0.0000i]
AP87 = [0.0695 - 0.0000i   0.0970 - 0.0000i   0.4482 - 0.0000i   0.8474 - 0.0000i   0.9498 - 0.0000i   0.6822 - 0.0000i   0.5881 - 0.0000i   0.5644 - 0.0000i 0.5527 - 0.0000i   0.5508 - 0.0000i]
AP88 = [0.0691 - 0.0000i   0.0973 - 0.0000i   0.4492 - 0.0000i   0.8484 - 0.0000i   0.9496 - 0.0000i   0.6821 - 0.0000i   0.5881 - 0.0000i   0.5644 - 0.0000i 0.5528 - 0.0000i   0.5509 - 0.0000i]
AP89 = [0.0688 - 0.0000i   0.0974 - 0.0000i   0.4499 - 0.0000i   0.8489 - 0.0000i   0.9495 - 0.0000i   0.6820 - 0.0000i   0.5881 - 0.0000i   0.5645 - 0.0000i 0.5529 - 0.0000i   0.5510 - 0.0000i]

p-polarization values

RP1 = [0.8190   0.8455   0.1113   0.7096   0.7506   0.3522   0.4467   0.4937   0.5264   0.5577]
RP2 = [0.8198   0.8450   0.1118   0.7106   0.7498   0.3518   0.4466   0.4936   0.5263   0.5576]
RP3 = [0.8211   0.8440   0.1126   0.7121   0.7485   0.3511   0.4464   0.4935   0.5262   0.5575]
RP4 = [0.8230   0.8427   0.1138   0.7142   0.7467   0.3502   0.4461   0.4933   0.5260   0.5572]
RP5 = [0.8253   0.8410   0.1156   0.7169   0.7443   0.3490   0.4457   0.4930   0.5258   0.5569]
RP6 = [0.8282   0.8388   0.1179   0.7200   0.7414   0.3476   0.4453   0.4927   0.5255   0.5566]
RP7 = [0.8316   0.8362   0.1209   0.7237   0.7379   0.3459   0.4447   0.4923   0.5251   0.5561]
RP8 = [0.8355   0.8331   0.1248   0.7278   0.7338   0.3440   0.4441   0.4919   0.5247   0.5556]
RP9 = [0.8399   0.8295   0.1296   0.7322   0.7293   0.3419   0.4434   0.4914   0.5242   0.5550]
RP10 = [0.8447   0.8254   0.1357   0.7370   0.7241   0.3396   0.4427   0.4909   0.5237   0.5544]
RP11 = [0.8500   0.8207   0.1430   0.7420   0.7184   0.3371   0.4419   0.4903   0.5231   0.5537]
RP12 = [0.8556   0.8153   0.1519   0.7472   0.7121   0.3344   0.4410   0.4897   0.5225   0.5529]
RP13 = [0.8617   0.8093   0.1625   0.7525   0.7052   0.3315   0.4400   0.4889   0.5218   0.5521]
RP14 = [0.8680   0.8025   0.1749   0.7578   0.6978   0.3285   0.4390   0.4882   0.5210   0.5511]
RP15 = [0.8747   0.7949   0.1893   0.7631   0.6897   0.3254   0.4379   0.4874   0.5202   0.5502]
RP16 = [0.8815   0.7864   0.2057   0.7683   0.6811   0.3221   0.4367   0.4865   0.5193   0.5491]

RP17 = [0.8886 0.7769 0.2243 0.7733 0.6720 0.3187 0.4355 0.4856 0.5184 0.5479]
RP18 = [0.8957 0.7664 0.2449 0.7781 0.6623 0.3153 0.4343 0.4846 0.5174 0.5467]
RP19 = [0.9029 0.7547 0.2677 0.7825 0.6520 0.3118 0.4329 0.4836 0.5164 0.5454]
RP20 = [0.9100 0.7416 0.2923 0.7866 0.6413 0.3082 0.4316 0.4825 0.5153 0.5441]
RP21 = [0.9169 0.7272 0.3187 0.7902 0.6300 0.3045 0.4301 0.4814 0.5141 0.5426]
RP22 = [0.9236 0.7113 0.3465 0.7934 0.6182 0.3008 0.4287 0.4802 0.5129 0.5411]
RP23 = [0.9300 0.6937 0.3755 0.7961 0.6059 0.2971 0.4271 0.4790 0.5116 0.5394]
RP24 = [0.9358 0.6745 0.4053 0.7982 0.5932 0.2934 0.4256 0.4777 0.5103 0.5377]
RP25 = [0.9411 0.6534 0.4356 0.7998 0.5801 0.2897 0.4240 0.4764 0.5089 0.5359]
RP26 = [0.9458 0.6304 0.4660 0.8007 0.5665 0.2860 0.4223 0.4750 0.5074 0.5340]
RP27 = [0.9496 0.6056 0.4961 0.8011 0.5526 0.2823 0.4207 0.4736 0.5059 0.5320]
RP28 = [0.9525 0.5790 0.5256 0.8008 0.5383 0.2786 0.4189 0.4721 0.5043 0.5299]
RP29 = [0.9543 0.5509 0.5543 0.7999 0.5237 0.2750 0.4172 0.4706 0.5026 0.5277]
RP30 = [0.9551 0.5215 0.5817 0.7983 0.5087 0.2714 0.4154 0.4690 0.5008 0.5254]
RP31 = [0.9546 0.4915 0.6079 0.7962 0.4935 0.2679 0.4136 0.4674 0.4990 0.5230]
RP32 = [0.9528 0.4615 0.6325 0.7933 0.4781 0.2644 0.4118 0.4657 0.4971 0.5205]
RP33 = [0.9497 0.4325 0.6555 0.7899 0.4623 0.2610 0.4099 0.4640 0.4951 0.5178]
RP34 = [0.9451 0.4058 0.6768 0.7859 0.4464 0.2577 0.4080 0.4622 0.4930 0.5150]
RP35 = [0.9390 0.3826 0.6965 0.7812 0.4302 0.2545 0.4061 0.4603 0.4909 0.5121]
RP36 = [0.9313 0.3645 0.7144 0.7760 0.4139 0.2513 0.4042 0.4584 0.4886 0.5090]
RP37 = [0.9222 0.3527 0.7307 0.7701 0.3974 0.2483 0.4023 0.4565 0.4863 0.5058]
RP38 = [0.9115 0.3483 0.7454 0.7637 0.3807 0.2453 0.4003 0.4545 0.4838 0.5024]
RP39 = [0.8993 0.3518 0.7585 0.7567 0.3638 0.2425 0.3983 0.4524 0.4813 0.4988]
RP40 = [0.8855 0.3634 0.7702 0.7491 0.3469 0.2398 0.3963 0.4502 0.4786 0.4951]
RP41 = [0.8704 0.3824 0.7804 0.7409 0.3297 0.2373 0.3943 0.4480 0.4758 0.4911]
RP42 = [0.8538 0.4079 0.7894 0.7321 0.3125 0.2349 0.3923 0.4457 0.4729 0.4870]
RP43 = [0.8359 0.4385 0.7971 0.7226 0.2951 0.2326 0.3903 0.4434 0.4699 0.4826]
RP44 = [0.8167 0.4727 0.8036 0.7125 0.2777 0.2305 0.3883 0.4409 0.4667 0.4780]
RP45 = [0.7964 0.5090 0.8091 0.7017 0.2601 0.2286 0.3863 0.4384 0.4634 0.4732]
RP46 = [0.7751 0.5461 0.8135 0.6902 0.2425 0.2269 0.3843 0.4359 0.4599 0.4681]
RP47 = [0.7529 0.5829 0.8169 0.6780 0.2248 0.2254 0.3823 0.4332 0.4562 0.4628]
RP48 = [0.7300 0.6186 0.8194 0.6649 0.2071 0.2241 0.3803 0.4305 0.4524 0.4571]
RP49 = [0.7066 0.6526 0.8209 0.6509 0.1894 0.2231 0.3783 0.4276 0.4484 0.4512]
RP50 = [0.6828 0.6846 0.8215 0.6360 0.1718 0.2223 0.3764 0.4247 0.4443 0.4449]
RP51 = [0.6590 0.7143 0.8212 0.6200 0.1544 0.2218 0.3745 0.4217 0.4399 0.4382]
RP52 = [0.6354 0.7417 0.8201 0.6029 0.1372 0.2217 0.3726 0.4187 0.4353 0.4312]
RP53 = [0.6123 0.7668 0.8179 0.5845 0.1204 0.2219 0.3708 0.4155 0.4305 0.4239]
RP54 = [0.5902 0.7897 0.8148 0.5647 0.1040 0.2225 0.3690 0.4123 0.4255 0.4161]
RP55 = [0.5694 0.8104 0.8107 0.5433 0.0883 0.2234 0.3674 0.4089 0.4202 0.4079]
RP56 = [0.5505 0.8291 0.8054 0.5203 0.0735 0.2248 0.3658 0.4055 0.4148 0.3993]
RP57 = [0.5341 0.8458 0.7988 0.4954 0.0598 0.2267 0.3643 0.4020 0.4091 0.3903]
RP58 = [0.5209 0.8608 0.7909 0.4686 0.0475 0.2290 0.3629 0.3985 0.4031 0.3808]
RP59 = [0.5118 0.8739 0.7813 0.4396 0.0370 0.2319 0.3617 0.3949 0.3969 0.3710]
RP60 = [0.5076 0.8854 0.7700 0.4084 0.0284 0.2353 0.3607 0.3913 0.3905 0.3607]
RP61 = [0.5095 0.8951 0.7567 0.3749 0.0223 0.2393 0.3599 0.3877 0.3840 0.3500]
RP62 = [0.5184 0.9032 0.7410 0.3392 0.0189 0.2438 0.3592 0.3841 0.3772 0.3390]
RP63 = [0.5352 0.9095 0.7226 0.3014 0.0186 0.2490 0.3588 0.3805 0.3703 0.3278]
RP64 = [0.5606 0.9139 0.7010 0.2618 0.0217 0.2547 0.3587 0.3770 0.3633 0.3163]
RP65 = [0.5946 0.9163 0.6759 0.2211 0.0284 0.2610 0.3589 0.3736 0.3562 0.3048]
RP66 = [0.6366 0.9166 0.6468 0.1801 0.0387 0.2678 0.3594 0.3704 0.3492 0.2933]
RP67 = [0.6847 0.9143 0.6133 0.1400 0.0526 0.2751 0.3603 0.3673 0.3423 0.2820]

RP68 = [0.7360 0.9094 0.5750 0.1021 0.0699 0.2829 0.3615 0.3645 0.3355 0.2711]
RP69 = [0.7870 0.9015 0.5317 0.0682 0.0903 0.2910 0.3630 0.3620 0.3291 0.2607]
RP70 = [0.8339 0.8902 0.4836 0.0399 0.1132 0.2995 0.3650 0.3599 0.3230 0.2511]
RP71 = [0.8733 0.8752 0.4312 0.0188 0.1381 0.3081 0.3673 0.3581 0.3174 0.2424]
RP72 = [0.9031 0.8563 0.3757 0.0061 0.1643 0.3169 0.3701 0.3568 0.3124 0.2349]
RP73 = [0.9227 0.8333 0.3189 0.0021 0.1912 0.3256 0.3731 0.3559 0.3081 0.2287]
RP74 = [0.9325 0.8064 0.2630 0.0069 0.2181 0.3343 0.3764 0.3555 0.3045 0.2240]
RP75 = [0.9340 0.7756 0.2108 0.0194 0.2445 0.3428 0.3800 0.3557 0.3018 0.2208]
RP76 = [0.9289 0.7416 0.1648 0.0384 0.2699 0.3510 0.3839 0.3562 0.2999 0.2192]
RP77 = [0.9191 0.7053 0.1272 0.0621 0.2939 0.3588 0.3878 0.3573 0.2988 0.2190]
RP78 = [0.9064 0.6676 0.0991 0.0888 0.3162 0.3662 0.3918 0.3587 0.2985 0.2202]
RP79 = [0.8920 0.6298 0.0808 0.1168 0.3366 0.3731 0.3958 0.3604 0.2990 0.2227]
RP80 = [0.8771 0.5931 0.0713 0.1448 0.3551 0.3795 0.3998 0.3624 0.3000 0.2261]
RP81 = [0.8624 0.5586 0.0691 0.1717 0.3716 0.3852 0.4036 0.3646 0.3016 0.2302]
RP82 = [0.8486 0.5273 0.0725 0.1967 0.3861 0.3904 0.4072 0.3669 0.3034 0.2348]
RP83 = [0.8360 0.4997 0.0797 0.2194 0.3987 0.3950 0.4105 0.3691 0.3055 0.2395]
RP84 = [0.8248 0.4762 0.0888 0.2392 0.4093 0.3989 0.4135 0.3713 0.3077 0.2442]
RP85 = [0.8151 0.4567 0.0985 0.2561 0.4182 0.4022 0.4161 0.3732 0.3097 0.2486]
RP86 = [0.8072 0.4413 0.1077 0.2699 0.4253 0.4049 0.4183 0.3749 0.3116 0.2525]
RP87 = [0.8010 0.4297 0.1156 0.2806 0.4308 0.4070 0.4200 0.3763 0.3132 0.2557]
RP88 = [0.7966 0.4217 0.1215 0.2883 0.4346 0.4085 0.4212 0.3774 0.3144 0.2580]
RP89 = [0.7939 0.4169 0.1253 0.2929 0.4369 0.4094 0.4220 0.3780 0.3151 0.2595]

AP1 = [0.1810 - 0.0000i 0.1545 - 0.0000i 0.8887 - 0.0000i 0.2904 - 0.0000i 0.2494 - 0.0000i 0.6478 - 0.0000i 0.5533 - 0.0000i 0.5063 - 0.0000i 0.4736 - 0.0000i 0.4423 - 0.0000i]
AP2 = [0.1802 - 0.0000i 0.1550 - 0.0000i 0.8882 - 0.0000i 0.2894 - 0.0000i 0.2502 - 0.0000i 0.6482 - 0.0000i 0.5534 - 0.0000i 0.5064 - 0.0000i 0.4737 - 0.0000i 0.4424 - 0.0000i]
AP3 = [0.1789 - 0.0000i 0.1560 - 0.0000i 0.8874 - 0.0000i 0.2879 - 0.0000i 0.2515 - 0.0000i 0.6489 - 0.0000i 0.5536 - 0.0000i 0.5065 - 0.0000i 0.4738 - 0.0000i 0.4425 - 0.0000i]
AP4 = [0.1770 - 0.0000i 0.1573 - 0.0000i 0.8862 - 0.0000i 0.2858 - 0.0000i 0.2533 - 0.0000i 0.6498 - 0.0000i 0.5539 - 0.0000i 0.5067 - 0.0000i 0.4740 - 0.0000i 0.4428 - 0.0000i]
AP5 = [0.1747 - 0.0000i 0.1590 - 0.0000i 0.8844 - 0.0000i 0.2831 - 0.0000i 0.2557 - 0.0000i 0.6510 - 0.0000i 0.5543 - 0.0000i 0.5070 - 0.0000i 0.4742 - 0.0000i 0.4431 - 0.0000i]
AP6 = [0.1718 - 0.0000i 0.1612 - 0.0000i 0.8821 - 0.0000i 0.2800 - 0.0000i 0.2586 - 0.0000i 0.6524 - 0.0000i 0.5547 - 0.0000i 0.5073 - 0.0000i 0.4745 - 0.0000i 0.4434 - 0.0000i]
AP7 = [0.1684 - 0.0000i 0.1638 - 0.0000i 0.8791 - 0.0000i 0.2763 - 0.0000i 0.2621 - 0.0000i 0.6541 - 0.0000i 0.5553 - 0.0000i 0.5077 - 0.0000i 0.4749 - 0.0000i 0.4439 - 0.0000i]
AP8 = [0.1645 - 0.0000i 0.1669 - 0.0000i 0.8752 - 0.0000i 0.2722 - 0.0000i 0.2662 - 0.0000i 0.6560 - 0.0000i 0.5559 - 0.0000i 0.5081 - 0.0000i 0.4753 - 0.0000i 0.4444 - 0.0000i]
AP9 = [0.1601 - 0.0000i 0.1705 - 0.0000i 0.8704 - 0.0000i 0.2678 - 0.0000i 0.2707 - 0.0000i 0.6581 - 0.0000i 0.5566 - 0.0000i 0.5086 - 0.0000i 0.4758 - 0.0000i 0.4450 - 0.0000i]
AP10 = [0.1553 - 0.0000i 0.1746 - 0.0000i 0.8643 - 0.0000i 0.2630 - 0.0000i 0.2759 - 0.0000i 0.6604 - 0.0000i 0.5573 - 0.0000i 0.5091 - 0.0000i 0.4763 - 0.0000i 0.4456 - 0.0000i]
AP11 = [0.1500 - 0.0000i 0.1793 - 0.0000i 0.8570 - 0.0000i 0.2580 - 0.0000i 0.2816 - 0.0000i 0.6629 - 0.0000i 0.5581 - 0.0000i 0.5097 - 0.0000i 0.4769 - 0.0000i 0.4463 - 0.0000i]
AP12 = [0.1444 - 0.0000i 0.1847 - 0.0000i 0.8481 - 0.0000i 0.2528 - 0.0000i 0.2879 - 0.0000i 0.6656 - 0.0000i 0.5590 - 0.0000i 0.5103 - 0.0000i 0.4775 - 0.0000i 0.4471 - 0.0000i]
AP13 = [0.1383 - 0.0000i 0.1907 - 0.0000i 0.8375 - 0.0000i 0.2475 - 0.0000i 0.2948 - 0.0000i 0.6685 - 0.0000i 0.5600 - 0.0000i 0.5111 - 0.0000i 0.4782 - 0.0000i 0.4479 - 0.0000i]

AP14 = [0.1320 - 0.0000i 0.1975 - 0.0000i 0.8251 - 0.0000i 0.2422 - 0.0000i 0.3022 - 0.0000i 0.6715 - 0.0000i 0.5610 - 0.0000i 0.5118 - 0.0000i 0.4790 - 0.0000i 0.4489 - 0.0000i]
AP15 = [0.1253 - 0.0000i 0.2051 - 0.0000i 0.8107 - 0.0000i 0.2369 - 0.0000i 0.3103 - 0.0000i 0.6746 - 0.0000i 0.5621 - 0.0000i 0.5126 - 0.0000i 0.4798 - 0.0000i 0.4498 - 0.0000i]
AP16 = [0.1185 - 0.0000i 0.2136 - 0.0000i 0.7943 - 0.0000i 0.2317 - 0.0000i 0.3189 - 0.0000i 0.6779 - 0.0000i 0.5633 - 0.0000i 0.5135 - 0.0000i 0.4807 - 0.0000i 0.4509 - 0.0000i]
AP17 = [0.1114 - 0.0000i 0.2231 - 0.0000i 0.7757 - 0.0000i 0.2267 - 0.0000i 0.3280 - 0.0000i 0.6813 - 0.0000i 0.5645 - 0.0000i 0.5144 - 0.0000i 0.4816 - 0.0000i 0.4521 - 0.0000i]
AP18 = [0.1043 - 0.0000i 0.2336 - 0.0000i 0.7551 - 0.0000i 0.2219 - 0.0000i 0.3377 - 0.0000i 0.6847 - 0.0000i 0.5657 - 0.0000i 0.5154 - 0.0000i 0.4826 - 0.0000i 0.4533 - 0.0000i]
AP19 = [0.0971 - 0.0000i 0.2453 - 0.0000i 0.7323 - 0.0000i 0.2175 - 0.0000i 0.3480 - 0.0000i 0.6882 - 0.0000i 0.5671 - 0.0000i 0.5164 - 0.0000i 0.4836 - 0.0000i 0.4546 - 0.0000i]
AP20 = [0.0900 - 0.0000i 0.2584 - 0.0000i 0.7077 - 0.0000i 0.2134 - 0.0000i 0.3587 - 0.0000i 0.6918 - 0.0000i 0.5684 - 0.0000i 0.5175 - 0.0000i 0.4847 - 0.0000i 0.4559 - 0.0000i]
AP21 = [0.0831 - 0.0000i 0.2728 - 0.0000i 0.6813 - 0.0000i 0.2098 - 0.0000i 0.3700 - 0.0000i 0.6955 - 0.0000i 0.5699 - 0.0000i 0.5186 - 0.0000i 0.4859 - 0.0000i 0.4574 - 0.0000i]
AP22 = [0.0764 - 0.0000i 0.2887 - 0.0000i 0.6535 - 0.0000i 0.2066 - 0.0000i 0.3818 - 0.0000i 0.6992 - 0.0000i 0.5713 - 0.0000i 0.5198 - 0.0000i 0.4871 - 0.0000i 0.4589 - 0.0000i]
AP23 = [0.0700 - 0.0000i 0.3063 - 0.0000i 0.6245 - 0.0000i 0.2039 - 0.0000i 0.3941 - 0.0000i 0.7029 - 0.0000i 0.5729 - 0.0000i 0.5210 - 0.0000i 0.4884 - 0.0000i 0.4606 - 0.0000i]
AP24 = [0.0642 - 0.0000i 0.3255 - 0.0000i 0.5947 - 0.0000i 0.2018 - 0.0000i 0.4068 - 0.0000i 0.7066 - 0.0000i 0.5744 - 0.0000i 0.5223 - 0.0000i 0.4897 - 0.0000i 0.4623 - 0.0000i]
AP25 = [0.0588 - 0.0000i 0.3466 - 0.0000i 0.5644 - 0.0000i 0.2002 - 0.0000i 0.4199 - 0.0000i 0.7103 - 0.0000i 0.5760 - 0.0000i 0.5236 - 0.0000i 0.4911 - 0.0000i 0.4641 - 0.0000i]
AP26 = [0.0542 - 0.0000i 0.3696 - 0.0000i 0.5340 - 0.0000i 0.1993 - 0.0000i 0.4335 - 0.0000i 0.7140 - 0.0000i 0.5777 - 0.0000i 0.5250 - 0.0000i 0.4926 - 0.0000i 0.4660 - 0.0000i]
AP27 = [0.0504 - 0.0000i 0.3944 - 0.0000i 0.5039 - 0.0000i 0.1989 - 0.0000i 0.4474 - 0.0000i 0.7177 - 0.0000i 0.5793 - 0.0000i 0.5264 - 0.0000i 0.4941 - 0.0000i 0.4680 - 0.0000i]
AP28 = [0.0475 - 0.0000i 0.4210 - 0.0000i 0.4744 - 0.0000i 0.1992 - 0.0000i 0.4617 - 0.0000i 0.7214 - 0.0000i 0.5811 - 0.0000i 0.5279 - 0.0000i 0.4957 - 0.0000i 0.4701 - 0.0000i]
AP29 = [0.0457 - 0.0000i 0.4491 - 0.0000i 0.4457 - 0.0000i 0.2001 - 0.0000i 0.4763 - 0.0000i 0.7250 - 0.0000i 0.5828 - 0.0000i 0.5294 - 0.0000i 0.4974 - 0.0000i 0.4723 - 0.0000i]
AP30 = [0.0449 - 0.0000i 0.4785 - 0.0000i 0.4183 - 0.0000i 0.2017 - 0.0000i 0.4913 - 0.0000i 0.7286 - 0.0000i 0.5846 - 0.0000i 0.5310 - 0.0000i 0.4992 - 0.0000i 0.4746 - 0.0000i]
AP31 = [0.0454 - 0.0000i 0.5085 - 0.0000i 0.3921 - 0.0000i 0.2038 - 0.0000i 0.5065 - 0.0000i 0.7321 - 0.0000i 0.5864 - 0.0000i 0.5326 - 0.0000i 0.5010 - 0.0000i 0.4770 - 0.0000i]
AP32 = [0.0472 - 0.0000i 0.5385 - 0.0000i 0.3675 - 0.0000i 0.2067 - 0.0000i 0.5219 - 0.0000i 0.7356 - 0.0000i 0.5882 - 0.0000i 0.5343 - 0.0000i 0.5029 - 0.0000i 0.4795 - 0.0000i]
AP33 = [0.0503 - 0.0000i 0.5675 - 0.0000i 0.3445 - 0.0000i 0.2101 - 0.0000i 0.5377 - 0.0000i 0.7390 - 0.0000i 0.5901 - 0.0000i 0.5360 - 0.0000i 0.5049 - 0.0000i 0.4822 - 0.0000i]
AP34 = [0.0549 - 0.0000i 0.5942 - 0.0000i 0.3232 - 0.0000i 0.2141 - 0.0000i 0.5536 - 0.0000i 0.7423 - 0.0000i 0.5920 - 0.0000i 0.5378 - 0.0000i 0.5070 - 0.0000i 0.4850 - 0.0000i]
AP35 = [0.0610 - 0.0000i 0.6174 - 0.0000i 0.3035 - 0.0000i 0.2188 - 0.0000i 0.5698 - 0.0000i 0.7455 - 0.0000i 0.5939 - 0.0000i 0.5397 - 0.0000i 0.5091 - 0.0000i 0.4879 - 0.0000i]
AP36 = [0.0687 - 0.0000i 0.6355 - 0.0000i 0.2856 - 0.0000i 0.2240 - 0.0000i 0.5861 - 0.0000i 0.7487 - 0.0000i 0.5958 - 0.0000i 0.5416 - 0.0000i 0.5114 - 0.0000i 0.4910 - 0.0000i]
AP37 = [0.0778 - 0.0000i 0.6473 - 0.0000i 0.2693 - 0.0000i 0.2299 - 0.0000i 0.6026 - 0.0000i 0.7517 - 0.0000i 0.5977 - 0.0000i 0.5435 - 0.0000i 0.5137 - 0.0000i 0.4942 - 0.0000i]
AP38 = [0.0885 - 0.0000i 0.6517 - 0.0000i 0.2546 - 0.0000i 0.2363 - 0.0000i 0.6193 - 0.0000i 0.7547 - 0.0000i 0.5997 - 0.0000i 0.5455 - 0.0000i 0.5162 - 0.0000i 0.4976 - 0.0000i]

AP39 = [0.1007 - 0.0000i 0.6482 - 0.0000i 0.2415 - 0.0000i 0.2433 - 0.0000i 0.6362 - 0.0000i 0.7575 - 0.0000i 0.6017 - 0.0000i 0.5476 - 0.0000i 0.5187 - 0.0000i 0.5012 - 0.0000i]
AP40 = [0.1144 - 0.0000i 0.6366 - 0.0000i 0.2298 - 0.0000i 0.2509 - 0.0000i 0.6531 - 0.0000i 0.7602 - 0.0000i 0.6037 - 0.0000i 0.5498 - 0.0000i 0.5214 - 0.0000i 0.5049 - 0.0000i]
AP41 = [0.1296 - 0.0000i 0.6176 - 0.0000i 0.2196 - 0.0000i 0.2591 - 0.0000i 0.6703 - 0.0000i 0.7627 - 0.0000i 0.6057 - 0.0000i 0.5520 - 0.0000i 0.5242 - 0.0000i 0.5089 - 0.0000i]
AP42 = [0.1462 - 0.0000i 0.5921 - 0.0000i 0.2106 - 0.0000i 0.2679 - 0.0000i 0.6875 - 0.0000i 0.7651 - 0.0000i 0.6077 - 0.0000i 0.5543 - 0.0000i 0.5271 - 0.0000i 0.5130 - 0.0000i]
AP43 = [0.1641 - 0.0000i 0.5615 - 0.0000i 0.2029 - 0.0000i 0.2774 - 0.0000i 0.7049 - 0.0000i 0.7674 - 0.0000i 0.6097 - 0.0000i 0.5566 - 0.0000i 0.5301 - 0.0000i 0.5174 - 0.0000i]
AP44 = [0.1833 - 0.0000i 0.5273 - 0.0000i 0.1964 - 0.0000i 0.2875 - 0.0000i 0.7223 - 0.0000i 0.7695 - 0.0000i 0.6117 - 0.0000i 0.5591 - 0.0000i 0.5333 - 0.0000i 0.5220 - 0.0000i]
AP45 = [0.2036 - 0.0000i 0.4910 - 0.0000i 0.1909 - 0.0000i 0.2983 - 0.0000i 0.7399 - 0.0000i 0.7714 - 0.0000i 0.6137 - 0.0000i 0.5616 - 0.0000i 0.5366 - 0.0000i 0.5268 - 0.0000i]
AP46 = [0.2249 - 0.0000i 0.4539 - 0.0000i 0.1865 - 0.0000i 0.3098 - 0.0000i 0.7575 - 0.0000i 0.7731 - 0.0000i 0.6157 - 0.0000i 0.5641 - 0.0000i 0.5401 - 0.0000i 0.5319 - 0.0000i]
AP47 = [0.2471 - 0.0000i 0.4171 - 0.0000i 0.1831 - 0.0000i 0.3220 - 0.0000i 0.7752 - 0.0000i 0.7746 - 0.0000i 0.6177 - 0.0000i 0.5668 - 0.0000i 0.5438 - 0.0000i 0.5372 - 0.0000i]
AP48 = [0.2700 - 0.0000i 0.3814 - 0.0000i 0.1806 - 0.0000i 0.3351 - 0.0000i 0.7929 - 0.0000i 0.7759 - 0.0000i 0.6197 - 0.0000i 0.5695 - 0.0000i 0.5476 - 0.0000i 0.5429 - 0.0000i]
AP49 = [0.2934 - 0.0000i 0.3474 - 0.0000i 0.1791 - 0.0000i 0.3491 - 0.0000i 0.8106 - 0.0000i 0.7769 - 0.0000i 0.6217 - 0.0000i 0.5724 - 0.0000i 0.5516 - 0.0000i 0.5488 - 0.0000i]
AP50 = [0.3172 - 0.0000i 0.3154 - 0.0000i 0.1785 - 0.0000i 0.3640 - 0.0000i 0.8282 - 0.0000i 0.7777 - 0.0000i 0.6236 - 0.0000i 0.5753 - 0.0000i 0.5557 - 0.0000i 0.5551 - 0.0000i]
AP51 = [0.3410 - 0.0000i 0.2857 - 0.0000i 0.1788 - 0.0000i 0.3800 - 0.0000i 0.8456 - 0.0000i 0.7782 - 0.0000i 0.6255 - 0.0000i 0.5783 - 0.0000i 0.5601 - 0.0000i 0.5618 - 0.0000i]
AP52 = [0.3646 - 0.0000i 0.2583 - 0.0000i 0.1799 - 0.0000i 0.3971 - 0.0000i 0.8628 - 0.0000i 0.7783 - 0.0000i 0.6274 - 0.0000i 0.5813 - 0.0000i 0.5647 - 0.0000i 0.5688 - 0.0000i]
AP53 = [0.3877 - 0.0000i 0.2332 - 0.0000i 0.1821 - 0.0000i 0.4155 - 0.0000i 0.8796 - 0.0000i 0.7781 - 0.0000i 0.6292 - 0.0000i 0.5845 - 0.0000i 0.5695 - 0.0000i 0.5761 - 0.0000i]
AP54 = [0.4098 - 0.0000i 0.2103 - 0.0000i 0.1852 - 0.0000i 0.4353 - 0.0000i 0.8960 - 0.0000i 0.7775 - 0.0000i 0.6310 - 0.0000i 0.5877 - 0.0000i 0.5745 - 0.0000i 0.5839 - 0.0000i]
AP55 = [0.4306 - 0.0000i 0.1896 - 0.0000i 0.1893 - 0.0000i 0.4567 - 0.0000i 0.9117 - 0.0000i 0.7766 - 0.0000i 0.6326 - 0.0000i 0.5911 - 0.0000i 0.5798 - 0.0000i 0.5921 - 0.0000i]
AP56 = [0.4495 - 0.0000i 0.1709 - 0.0000i 0.1946 - 0.0000i 0.4797 - 0.0000i 0.9265 - 0.0000i 0.7752 - 0.0000i 0.6342 - 0.0000i 0.5945 - 0.0000i 0.5852 - 0.0000i 0.6007 - 0.0000i]
AP57 = [0.4659 - 0.0000i 0.1542 - 0.0000i 0.2012 - 0.0000i 0.5046 - 0.0000i 0.9402 - 0.0000i 0.7733 - 0.0000i 0.6357 - 0.0000i 0.5980 - 0.0000i 0.5909 - 0.0000i 0.6097 - 0.0000i]
AP58 = [0.4791 - 0.0000i 0.1392 - 0.0000i 0.2091 - 0.0000i 0.5314 - 0.0000i 0.9525 - 0.0000i 0.7710 - 0.0000i 0.6371 - 0.0000i 0.6015 - 0.0000i 0.5969 - 0.0000i 0.6192 - 0.0000i]
AP59 = [0.4882 - 0.0000i 0.1261 - 0.0000i 0.2187 - 0.0000i 0.5604 - 0.0000i 0.9630 - 0.0000i 0.7681 - 0.0000i 0.6383 - 0.0000i 0.6051 - 0.0000i 0.6031 - 0.0000i 0.6290 - 0.0000i]
AP60 = [0.4924 - 0.0000i 0.1146 - 0.0000i 0.2300 - 0.0000i 0.5916 - 0.0000i 0.9716 - 0.0000i 0.7647 - 0.0000i 0.6393 - 0.0000i 0.6087 - 0.0000i 0.6095 - 0.0000i 0.6393 - 0.0000i]
AP61 = [0.4905 - 0.0000i 0.1049 - 0.0000i 0.2433 - 0.0000i 0.6251 - 0.0000i 0.9777 - 0.0000i 0.7607 - 0.0000i 0.6401 - 0.0000i 0.6123 - 0.0000i 0.6160 - 0.0000i 0.6500 - 0.0000i]
AP62 = [0.4816 - 0.0000i 0.0968 - 0.0000i 0.2590 - 0.0000i 0.6608 - 0.0000i 0.9811 - 0.0000i 0.7562 - 0.0000i 0.6408 - 0.0000i 0.6159 - 0.0000i 0.6228 - 0.0000i 0.6610 - 0.0000i]
AP63 = [0.4648 - 0.0000i 0.0905 - 0.0000i 0.2774 - 0.0000i 0.6986 - 0.0000i 0.9814 - 0.0000i 0.7510 - 0.0000i 0.6412 - 0.0000i 0.6195 - 0.0000i 0.6297 - 0.0000i 0.6722 - 0.0000i]

AP64 = [0.4394 - 0.0000i   0.0861 - 0.0000i   0.2990 - 0.0000i   0.7382 - 0.0000i   0.9783 - 0.0000i   0.7453 - 0.0000i   0.6413 - 0.0000i   0.6230 - 0.0000i 0.6367 - 0.0000i   0.6837 - 0.0000i]
AP65 = [0.4054 - 0.0000i   0.0837 - 0.0000i   0.3241 - 0.0000i   0.7789 - 0.0000i   0.9716 - 0.0000i   0.7390 - 0.0000i   0.6411 - 0.0000i   0.6264 - 0.0000i 0.6438 - 0.0000i   0.6952 - 0.0000i]
AP66 = [0.3634 - 0.0000i   0.0834 - 0.0000i   0.3532 - 0.0000i   0.8199 - 0.0000i   0.9613 - 0.0000i   0.7322 - 0.0000i   0.6406 - 0.0000i   0.6296 - 0.0000i 0.6508 - 0.0000i   0.7067 - 0.0000i]
AP67 = [0.3153 - 0.0000i   0.0857 - 0.0000i   0.3867 - 0.0000i   0.8600 - 0.0000i   0.9474 - 0.0000i   0.7249 - 0.0000i   0.6397 - 0.0000i   0.6327 - 0.0000i 0.6577 - 0.0000i   0.7180 - 0.0000i]
AP68 = [0.2640 - 0.0000i   0.0906 - 0.0000i   0.4250 - 0.0000i   0.8979 - 0.0000i   0.9301 - 0.0000i   0.7171 - 0.0000i   0.6385 - 0.0000i   0.6355 - 0.0000i 0.6645 - 0.0000i   0.7289 - 0.0000i]
AP69 = [0.2130 - 0.0000i   0.0985 - 0.0000i   0.4683 - 0.0000i   0.9318 - 0.0000i   0.9097 - 0.0000i   0.7090 - 0.0000i   0.6370 - 0.0000i   0.6380 - 0.0000i 0.6709 - 0.0000i   0.7393 - 0.0000i]
AP70 = [0.1661 - 0.0000i   0.1098 - 0.0000i   0.5164 - 0.0000i   0.9601 - 0.0000i   0.8868 - 0.0000i   0.7005 - 0.0000i   0.6350 - 0.0000i   0.6401 - 0.0000i 0.6770 - 0.0000i   0.7489 - 0.0000i]
AP71 = [0.1267 - 0.0000i   0.1248 - 0.0000i   0.5688 - 0.0000i   0.9812 - 0.0000i   0.8619 - 0.0000i   0.6919 - 0.0000i   0.6327 - 0.0000i   0.6419 - 0.0000i 0.6826 - 0.0000i   0.7576 - 0.0000i]
AP72 = [0.0969 - 0.0000i   0.1437 - 0.0000i   0.6243 - 0.0000i   0.9939 - 0.0000i   0.8357 - 0.0000i   0.6831 - 0.0000i   0.6299 - 0.0000i   0.6432 - 0.0000i 0.6876 - 0.0000i   0.7651 - 0.0000i]
AP73 = [0.0773 - 0.0000i   0.1667 - 0.0000i   0.6811 - 0.0000i   0.9979 - 0.0000i   0.8088 - 0.0000i   0.6744 - 0.0000i   0.6269 - 0.0000i   0.6441 - 0.0000i 0.6919 - 0.0000i   0.7713 - 0.0000i]
AP74 = [0.0675 - 0.0000i   0.1936 - 0.0000i   0.7370 - 0.0000i   0.9931 - 0.0000i   0.7819 - 0.0000i   0.6657 - 0.0000i   0.6236 - 0.0000i   0.6445 - 0.0000i 0.6955 - 0.0000i   0.7760 - 0.0000i]
AP75 = [0.0660 - 0.0000i   0.2244 - 0.0000i   0.7892 - 0.0000i   0.9806 - 0.0000i   0.7555 - 0.0000i   0.6572 - 0.0000i   0.6200 - 0.0000i   0.6443 - 0.0000i 0.6982 - 0.0000i   0.7792 - 0.0000i]
AP76 = [0.0711 - 0.0000i   0.2583 - 0.0000i   0.8352 - 0.0000i   0.9616 - 0.0000i   0.7301 - 0.0000i   0.6490 - 0.0000i   0.6161 - 0.0000i   0.6438 - 0.0000i 0.7001 - 0.0000i   0.7808 - 0.0000i]
AP77 = [0.0809 - 0.0000i   0.2947 - 0.0000i   0.8728 - 0.0000i   0.9379 - 0.0000i   0.7061 - 0.0000i   0.6412 - 0.0000i   0.6122 - 0.0000i   0.6427 - 0.0000i 0.7012 - 0.0000i   0.7810 - 0.0000i]
AP78 = [0.0936 - 0.0000i   0.3324 - 0.0000i   0.9008 - 0.0000i   0.9112 - 0.0000i   0.6838 - 0.0000i   0.6338 - 0.0000i   0.6082 - 0.0000i   0.6413 - 0.0000i 0.7015 - 0.0000i   0.7798 - 0.0000i]
AP79 = [0.1080 - 0.0000i   0.3702 - 0.0000i   0.9192 - 0.0000i   0.8832 - 0.0000i   0.6634 - 0.0000i   0.6269 - 0.0000i   0.6042 - 0.0000i   0.6396 - 0.0000i 0.7010 - 0.0000i   0.7773 - 0.0000i]
AP80 = [0.1229 - 0.0000i   0.4069 - 0.0000i   0.9287 - 0.0000i   0.8552 - 0.0000i   0.6449 - 0.0000i   0.6205 - 0.0000i   0.6002 - 0.0000i   0.6376 - 0.0000i 0.7000 - 0.0000i   0.7739 - 0.0000i]
AP81 = [0.1376 - 0.0000i   0.4414 - 0.0000i   0.9309 - 0.0000i   0.8283 - 0.0000i   0.6284 - 0.0000i   0.6148 - 0.0000i   0.5964 - 0.0000i   0.6354 - 0.0000i 0.6984 - 0.0000i   0.7698 - 0.0000i]
AP82 = [0.1514 - 0.0000i   0.4727 - 0.0000i   0.9275 - 0.0000i   0.8033 - 0.0000i   0.6139 - 0.0000i   0.6096 - 0.0000i   0.5928 - 0.0000i   0.6331 - 0.0000i 0.6966 - 0.0000i   0.7652 - 0.0000i]
AP83 = [0.1640 - 0.0000i   0.5003 - 0.0000i   0.9203 - 0.0000i   0.7806 - 0.0000i   0.6013 - 0.0000i   0.6050 - 0.0000i   0.5895 - 0.0000i   0.6309 - 0.0000i 0.6945 - 0.0000i   0.7605 - 0.0000i]
AP84 = [0.1752 - 0.0000i   0.5238 - 0.0000i   0.9112 - 0.0000i   0.7608 - 0.0000i   0.5907 - 0.0000i   0.6011 - 0.0000i   0.5865 - 0.0000i   0.6287 - 0.0000i 0.6923 - 0.0000i   0.7558 - 0.0000i]
AP85 = [0.1849 - 0.0000i   0.5433 - 0.0000i   0.9015 - 0.0000i   0.7439 - 0.0000i   0.5818 - 0.0000i   0.5978 - 0.0000i   0.5839 - 0.0000i   0.6268 - 0.0000i 0.6903 - 0.0000i   0.7514 - 0.0000i]
AP86 = [0.1928 - 0.0000i   0.5587 - 0.0000i   0.8923 - 0.0000i   0.7301 - 0.0000i   0.5747 - 0.0000i   0.5951 - 0.0000i   0.5817 - 0.0000i   0.6251 - 0.0000i 0.6884 - 0.0000i   0.7475 - 0.0000i]
AP87 = [0.1990 - 0.0000i   0.5703 - 0.0000i   0.8844 - 0.0000i   0.7194 - 0.0000i   0.5692 - 0.0000i   0.5930 - 0.0000i   0.5800 - 0.0000i   0.6237 - 0.0000i 0.6868 - 0.0000i   0.7443 - 0.0000i]
AP88 = [0.2034 - 0.0000i   0.5783 - 0.0000i   0.8785 - 0.0000i   0.7117 - 0.0000i   0.5654 - 0.0000i   0.5915 - 0.0000i   0.5788 - 0.0000i   0.6226 - 0.0000i 0.6856 - 0.0000i   0.7420 - 0.0000i]

AP89 = [0.2061 - 0.0000i   0.5831 - 0.0000i   0.8747 - 0.0000i   0.7071 - 0.0000i   0.5631 - 0.0000i   0.5906 - 0.0000i   0.5780 - 0.0000i   0.6220 - 0.0000i 0.6849 - 0.0000i   0.7405 - 0.0000i]

Simulation values of Matlab for Sensor Structure 3

s-polarization values

RP1 = [0.6943   0.7588   0.7797   0.7721   0.7666]
RP2 = [0.6943   0.7589   0.7797   0.7721   0.7666]
RP3 = [0.6943   0.7589   0.7798   0.7721   0.7666]
RP4 = [0.6944   0.7589   0.7798   0.7722   0.7666]
RP5 = [0.6945   0.7590   0.7798   0.7722   0.7666]
RP6 = [0.6946   0.7591   0.7799   0.7722   0.7667]
RP7 = [0.6948   0.7591   0.7799   0.7723   0.7667]
RP8 = [0.6949   0.7592   0.7800   0.7723   0.7668]
RP9 = [0.6951   0.7593   0.7801   0.7724   0.7668]
RP10 = [0.6953   0.7595   0.7801   0.7724   0.7669]
RP11 = [0.6955   0.7596   0.7802   0.7725   0.7669]
RP12 = [0.6958   0.7597   0.7803   0.7726   0.7670]
RP13 = [0.6960   0.7599   0.7804   0.7727   0.7671]
RP14 = [0.6963   0.7600   0.7805   0.7728   0.7671]
RP15 = [0.6966   0.7602   0.7807   0.7729   0.7672]
RP16 = [0.6969   0.7604   0.7808   0.7730   0.7673]
RP17 = [0.6973   0.7606   0.7809   0.7731   0.7674]
RP18 = [0.6976   0.7608   0.7811   0.7732   0.7675]
RP19 = [0.6980   0.7610   0.7812   0.7733   0.7676]
RP20 = [0.6984   0.7612   0.7814   0.7734   0.7677]
RP21 = [0.6988   0.7615   0.7815   0.7736   0.7679]
RP22 = [0.6992   0.7617   0.7817   0.7737   0.7680]
RP23 = [0.6996   0.7620   0.7818   0.7739   0.7681]
RP24 = [0.7000   0.7622   0.7820   0.7740   0.7682]
RP25 = [0.7005   0.7625   0.7822   0.7741   0.7684]
RP26 = [0.7010   0.7628   0.7824   0.7743   0.7685]
RP27 = [0.7014   0.7630   0.7826   0.7745   0.7686]
RP28 = [0.7019   0.7633   0.7828   0.7746   0.7688]
RP29 = [0.7024   0.7636   0.7830   0.7748   0.7689]
RP30 = [0.7029   0.7639   0.7832   0.7750   0.7691]
RP31 = [0.7035   0.7642   0.7834   0.7751   0.7692]
RP32 = [0.7040   0.7645   0.7836   0.7753   0.7694]
RP33 = [0.7045   0.7648   0.7838   0.7755   0.7695]
RP34 = [0.7051   0.7652   0.7840   0.7757   0.7697]
RP35 = [0.7056   0.7655   0.7843   0.7759   0.7699]
RP36 = [0.7062   0.7658   0.7845   0.7760   0.7700]
RP37 = [0.7067   0.7661   0.7847   0.7762   0.7702]
RP38 = [0.7073   0.7665   0.7849   0.7764   0.7704]
RP39 = [0.7078   0.7668   0.7852   0.7766   0.7705]
RP40 = [0.7084   0.7671   0.7854   0.7768   0.7707]
RP41 = [0.7090   0.7675   0.7856   0.7770   0.7709]

RP42 = [0.7096   0.7678   0.7859   0.7772   0.7710]
RP43 = [0.7101   0.7681   0.7861   0.7774   0.7712]
RP44 = [0.7107   0.7685   0.7863   0.7776   0.7714]
RP45 = [0.7113   0.7688   0.7866   0.7778   0.7716]
RP46 = [0.7118   0.7692   0.7868   0.7780   0.7717]
RP47 = [0.7124   0.7695   0.7870   0.7782   0.7719]
RP48 = [0.7130   0.7698   0.7873   0.7783   0.7721]
RP49 = [0.7135   0.7702   0.7875   0.7785   0.7722]
RP50 = [0.7141   0.7705   0.7877   0.7787   0.7724]
RP51 = [0.7146   0.7708   0.7880   0.7789   0.7726]
RP52 = [0.7152   0.7711   0.7882   0.7791   0.7727]
RP53 = [0.7157   0.7715   0.7884   0.7793   0.7729]
RP54 = [0.7162   0.7718   0.7886   0.7795   0.7731]
RP55 = [0.7168   0.7721   0.7888   0.7797   0.7732]
RP56 = [0.7173   0.7724   0.7891   0.7798   0.7734]
RP57 = [0.7178   0.7727   0.7893   0.7800   0.7735]
RP58 = [0.7183   0.7730   0.7895   0.7802   0.7737]
RP59 = [0.7188   0.7733   0.7897   0.7803   0.7738]
RP60 = [0.7192   0.7736   0.7899   0.7805   0.7740]
RP61 = [0.7197   0.7739   0.7901   0.7807   0.7741]
RP62 = [0.7202   0.7741   0.7903   0.7808   0.7743]
RP63 = [0.7206   0.7744   0.7905   0.7810   0.7744]
RP64 = [0.7210   0.7747   0.7906   0.7811   0.7746]
RP65 = [0.7215   0.7749   0.7908   0.7813   0.7747]
RP66 = [0.7219   0.7752   0.7910   0.7814   0.7748]
RP67 = [0.7223   0.7754   0.7911   0.7816   0.7749]
RP68 = [0.7226   0.7756   0.7913   0.7817   0.7751]
RP69 = [0.7230   0.7758   0.7915   0.7818   0.7752]
RP70 = [0.7233   0.7760   0.7916   0.7820   0.7753]
RP71 = [0.7237   0.7762   0.7918   0.7821   0.7754]
RP72 = [0.7240   0.7764   0.7919   0.7822   0.7755]
RP73 = [0.7243   0.7766   0.7920   0.7823   0.7756]
RP74 = [0.7246   0.7768   0.7921   0.7824   0.7757]
RP75 = [0.7249   0.7770   0.7923   0.7825   0.7758]
RP76 = [0.7251   0.7771   0.7924   0.7826   0.7758]
RP77 = [0.7254   0.7773   0.7925   0.7827   0.7759]
RP78 = [0.7256   0.7774   0.7926   0.7828   0.7760]
RP79 = [0.7258   0.7775   0.7926   0.7828   0.7761]
RP80 = [0.7260   0.7776   0.7927   0.7829   0.7761]
RP81 = [0.7262   0.7777   0.7928   0.7830   0.7762]
RP82 = [0.7263   0.7778   0.7929   0.7830   0.7762]
RP83 = [0.7264   0.7779   0.7929   0.7831   0.7763]
RP84 = [0.7266   0.7780   0.7930   0.7831   0.7763]
RP85 = [0.7267   0.7780   0.7930   0.7831   0.7763]
RP86 = [0.7267   0.7781   0.7930   0.7832   0.7764]
RP87 = [0.7268   0.7781   0.7931   0.7832   0.7764]
RP88 = [0.7269   0.7782   0.7931   0.7832   0.7764]
RP89 = [0.7269   0.7782   0.7931   0.7832   0.7764]

AP1 = [0.3057 - 0.0000i   0.2412 - 0.0000i   0.2203 - 0.0000i   0.2279 - 0.0000i   0.2334 - 0.0000i]
AP2 = [0.3057 - 0.0000i   0.2411 - 0.0000i   0.2203 - 0.0000i   0.2279 - 0.0000i   0.2334 - 0.0000i]

AP3 = [0.3057 - 0.0000i   0.2411 - 0.0000i   0.2202 - 0.0000i   0.2279 - 0.0000i   0.2334 - 0.0000i]
AP4 = [0.3056 - 0.0000i   0.2411 - 0.0000i   0.2202 - 0.0000i   0.2278 - 0.0000i   0.2334 - 0.0000i]
AP5 = [0.3055 - 0.0000i   0.2410 - 0.0000i   0.2202 - 0.0000i   0.2278 - 0.0000i   0.2334 - 0.0000i]
AP6 = [0.3054 - 0.0000i   0.2409 - 0.0000i   0.2201 - 0.0000i   0.2278 - 0.0000i   0.2333 - 0.0000i]
AP7 = [0.3052 - 0.0000i   0.2409 - 0.0000i   0.2201 - 0.0000i   0.2277 - 0.0000i   0.2333 - 0.0000i]
AP8 = [0.3051 - 0.0000i   0.2408 - 0.0000i   0.2200 - 0.0000i   0.2277 - 0.0000i   0.2332 - 0.0000i]
AP9 = [0.3049 - 0.0000i   0.2407 - 0.0000i   0.2199 - 0.0000i   0.2276 - 0.0000i   0.2332 - 0.0000i]
AP10 = [0.3047 - 0.0000i   0.2405 - 0.0000i   0.2199 - 0.0000i   0.2276 - 0.0000i   0.2331 - 0.0000i]
AP11 = [0.3045 - 0.0000i   0.2404 - 0.0000i   0.2198 - 0.0000i   0.2275 - 0.0000i   0.2331 - 0.0000i]
AP12 = [0.3042 - 0.0000i   0.2403 - 0.0000i   0.2197 - 0.0000i   0.2274 - 0.0000i   0.2330 - 0.0000i]
AP13 = [0.3040 - 0.0000i   0.2401 - 0.0000i   0.2196 - 0.0000i   0.2273 - 0.0000i   0.2329 - 0.0000i]
AP14 = [0.3037 - 0.0000i   0.2400 - 0.0000i   0.2195 - 0.0000i   0.2272 - 0.0000i   0.2329 - 0.0000i]
AP15 = [0.3034 - 0.0000i   0.2398 - 0.0000i   0.2193 - 0.0000i   0.2271 - 0.0000i   0.2328 - 0.0000i]
AP16 = [0.3031 - 0.0000i   0.2396 - 0.0000i   0.2192 - 0.0000i   0.2270 - 0.0000i   0.2327 - 0.0000i]
AP17 = [0.3027 - 0.0000i   0.2394 - 0.0000i   0.2191 - 0.0000i   0.2269 - 0.0000i   0.2326 - 0.0000i]
AP18 = [0.3024 - 0.0000i   0.2392 - 0.0000i   0.2189 - 0.0000i   0.2268 - 0.0000i   0.2325 - 0.0000i]
AP19 = [0.3020 - 0.0000i   0.2390 - 0.0000i   0.2188 - 0.0000i   0.2267 - 0.0000i   0.2324 - 0.0000i]
AP20 = [0.3016 - 0.0000i   0.2388 - 0.0000i   0.2186 - 0.0000i   0.2266 - 0.0000i   0.2323 - 0.0000i]
AP21 = [0.3012 - 0.0000i   0.2385 - 0.0000i   0.2185 - 0.0000i   0.2264 - 0.0000i   0.2321 - 0.0000i]
AP22 = [0.3008 - 0.0000i   0.2383 - 0.0000i   0.2183 - 0.0000i   0.2263 - 0.0000i   0.2320 - 0.0000i]
AP23 = [0.3004 - 0.0000i   0.2380 - 0.0000i   0.2182 - 0.0000i   0.2261 - 0.0000i   0.2319 - 0.0000i]
AP24 = [0.3000 - 0.0000i   0.2378 - 0.0000i   0.2180 - 0.0000i   0.2260 - 0.0000i   0.2318 - 0.0000i]
AP25 = [0.2995 - 0.0000i   0.2375 - 0.0000i   0.2178 - 0.0000i   0.2259 - 0.0000i   0.2316 - 0.0000i]
AP26 = [0.2990 - 0.0000i   0.2372 - 0.0000i   0.2176 - 0.0000i   0.2257 - 0.0000i   0.2315 - 0.0000i]
AP27 = [0.2986 - 0.0000i   0.2370 - 0.0000i   0.2174 - 0.0000i   0.2255 - 0.0000i   0.2314 - 0.0000i]
AP28 = [0.2981 - 0.0000i   0.2367 - 0.0000i   0.2172 - 0.0000i   0.2254 - 0.0000i   0.2312 - 0.0000i]
AP29 = [0.2976 - 0.0000i   0.2364 - 0.0000i   0.2170 - 0.0000i   0.2252 - 0.0000i   0.2311 - 0.0000i]
AP30 = [0.2971 - 0.0000i   0.2361 - 0.0000i   0.2168 - 0.0000i   0.2250 - 0.0000i   0.2309 - 0.0000i]
AP31 = [0.2965 - 0.0000i   0.2358 - 0.0000i   0.2166 - 0.0000i   0.2249 - 0.0000i   0.2308 - 0.0000i]
AP32 = [0.2960 - 0.0000i   0.2355 - 0.0000i   0.2164 - 0.0000i   0.2247 - 0.0000i   0.2306 - 0.0000i]
AP33 = [0.2955 - 0.0000i   0.2352 - 0.0000i   0.2162 - 0.0000i   0.2245 - 0.0000i   0.2305 - 0.0000i]
AP34 = [0.2949 - 0.0000i   0.2348 - 0.0000i   0.2160 - 0.0000i   0.2243 - 0.0000i   0.2303 - 0.0000i]
AP35 = [0.2944 - 0.0000i   0.2345 - 0.0000i   0.2157 - 0.0000i   0.2241 - 0.0000i   0.2301 - 0.0000i]
AP36 = [0.2938 - 0.0000i   0.2342 - 0.0000i   0.2155 - 0.0000i   0.2240 - 0.0000i   0.2300 - 0.0000i]
AP37 = [0.2933 - 0.0000i   0.2339 - 0.0000i   0.2153 - 0.0000i   0.2238 - 0.0000i   0.2298 - 0.0000i]
AP38 = [0.2927 - 0.0000i   0.2335 - 0.0000i   0.2151 - 0.0000i   0.2236 - 0.0000i   0.2296 - 0.0000i]
AP39 = [0.2922 - 0.0000i   0.2332 - 0.0000i   0.2148 - 0.0000i   0.2234 - 0.0000i   0.2295 - 0.0000i]
AP40 = [0.2916 - 0.0000i   0.2329 - 0.0000i   0.2146 - 0.0000i   0.2232 - 0.0000i   0.2293 - 0.0000i]
AP41 = [0.2910 - 0.0000i   0.2325 - 0.0000i   0.2144 - 0.0000i   0.2230 - 0.0000i   0.2291 - 0.0000i]
AP42 = [0.2904 - 0.0000i   0.2322 - 0.0000i   0.2141 - 0.0000i   0.2228 - 0.0000i   0.2290 - 0.0000i]
AP43 = [0.2899 - 0.0000i   0.2319 - 0.0000i   0.2139 - 0.0000i   0.2226 - 0.0000i   0.2288 - 0.0000i]
AP44 = [0.2893 - 0.0000i   0.2315 - 0.0000i   0.2137 - 0.0000i   0.2224 - 0.0000i   0.2286 - 0.0000i]
AP45 = [0.2887 - 0.0000i   0.2312 - 0.0000i   0.2134 - 0.0000i   0.2222 - 0.0000i   0.2284 - 0.0000i]
AP46 = [0.2882 - 0.0000i   0.2308 - 0.0000i   0.2132 - 0.0000i   0.2220 - 0.0000i   0.2283 - 0.0000i]
AP47 = [0.2876 - 0.0000i   0.2305 - 0.0000i   0.2130 - 0.0000i   0.2218 - 0.0000i   0.2281 - 0.0000i]
AP48 = [0.2870 - 0.0000i   0.2302 - 0.0000i   0.2127 - 0.0000i   0.2217 - 0.0000i   0.2279 - 0.0000i]
AP49 = [0.2865 - 0.0000i   0.2298 - 0.0000i   0.2125 - 0.0000i   0.2215 - 0.0000i   0.2278 - 0.0000i]
AP50 = [0.2859 - 0.0000i   0.2295 - 0.0000i   0.2123 - 0.0000i   0.2213 - 0.0000i   0.2276 - 0.0000i]
AP51 = [0.2854 - 0.0000i   0.2292 - 0.0000i   0.2120 - 0.0000i   0.2211 - 0.0000i   0.2274 - 0.0000i]
AP52 = [0.2848 - 0.0000i   0.2289 - 0.0000i   0.2118 - 0.0000i   0.2209 - 0.0000i   0.2273 - 0.0000i]
AP53 = [0.2843 - 0.0000i   0.2285 - 0.0000i   0.2116 - 0.0000i   0.2207 - 0.0000i   0.2271 - 0.0000i]

AP54 = [0.2838 - 0.0000i 0.2282 - 0.0000i 0.2114 - 0.0000i 0.2205 - 0.0000i 0.2269 - 0.0000i]
AP55 = [0.2832 - 0.0000i 0.2279 - 0.0000i 0.2112 - 0.0000i 0.2203 - 0.0000i 0.2268 - 0.0000i]
AP56 = [0.2827 - 0.0000i 0.2276 - 0.0000i 0.2109 - 0.0000i 0.2202 - 0.0000i 0.2266 - 0.0000i]
AP57 = [0.2822 - 0.0000i 0.2273 - 0.0000i 0.2107 - 0.0000i 0.2200 - 0.0000i 0.2265 - 0.0000i]
AP58 = [0.2817 - 0.0000i 0.2270 - 0.0000i 0.2105 - 0.0000i 0.2198 - 0.0000i 0.2263 - 0.0000i]
AP59 = [0.2812 - 0.0000i 0.2267 - 0.0000i 0.2103 - 0.0000i 0.2197 - 0.0000i 0.2262 - 0.0000i]
AP60 = [0.2808 - 0.0000i 0.2264 - 0.0000i 0.2101 - 0.0000i 0.2195 - 0.0000i 0.2260 - 0.0000i]
AP61 = [0.2803 - 0.0000i 0.2261 - 0.0000i 0.2099 - 0.0000i 0.2193 - 0.0000i 0.2259 - 0.0000i]
AP62 = [0.2798 - 0.0000i 0.2259 - 0.0000i 0.2097 - 0.0000i 0.2192 - 0.0000i 0.2257 - 0.0000i]
AP63 = [0.2794 - 0.0000i 0.2256 - 0.0000i 0.2095 - 0.0000i 0.2190 - 0.0000i 0.2256 - 0.0000i]
AP64 = [0.2790 - 0.0000i 0.2253 - 0.0000i 0.2094 - 0.0000i 0.2189 - 0.0000i 0.2254 - 0.0000i]
AP65 = [0.2785 - 0.0000i 0.2251 - 0.0000i 0.2092 - 0.0000i 0.2187 - 0.0000i 0.2253 - 0.0000i]
AP66 = [0.2781 - 0.0000i 0.2248 - 0.0000i 0.2090 - 0.0000i 0.2186 - 0.0000i 0.2252 - 0.0000i]
AP67 = [0.2777 - 0.0000i 0.2246 - 0.0000i 0.2089 - 0.0000i 0.2184 - 0.0000i 0.2251 - 0.0000i]
AP68 = [0.2774 - 0.0000i 0.2244 - 0.0000i 0.2087 - 0.0000i 0.2183 - 0.0000i 0.2249 - 0.0000i]
AP69 = [0.2770 - 0.0000i 0.2242 - 0.0000i 0.2085 - 0.0000i 0.2182 - 0.0000i 0.2248 - 0.0000i]
AP70 = [0.2767 - 0.0000i 0.2240 - 0.0000i 0.2084 - 0.0000i 0.2180 - 0.0000i 0.2247 - 0.0000i]
AP71 = [0.2763 - 0.0000i 0.2238 - 0.0000i 0.2082 - 0.0000i 0.2179 - 0.0000i 0.2246 - 0.0000i]
AP72 = [0.2760 - 0.0000i 0.2236 - 0.0000i 0.2081 - 0.0000i 0.2178 - 0.0000i 0.2245 - 0.0000i]
AP73 = [0.2757 - 0.0000i 0.2234 - 0.0000i 0.2080 - 0.0000i 0.2177 - 0.0000i 0.2244 - 0.0000i]
AP74 = [0.2754 - 0.0000i 0.2232 - 0.0000i 0.2079 - 0.0000i 0.2176 - 0.0000i 0.2243 - 0.0000i]
AP75 = [0.2751 - 0.0000i 0.2230 - 0.0000i 0.2077 - 0.0000i 0.2175 - 0.0000i 0.2242 - 0.0000i]
AP76 = [0.2749 - 0.0000i 0.2229 - 0.0000i 0.2076 - 0.0000i 0.2174 - 0.0000i 0.2242 - 0.0000i]
AP77 = [0.2746 - 0.0000i 0.2227 - 0.0000i 0.2075 - 0.0000i 0.2173 - 0.0000i 0.2241 - 0.0000i]
AP78 = [0.2744 - 0.0000i 0.2226 - 0.0000i 0.2074 - 0.0000i 0.2172 - 0.0000i 0.2240 - 0.0000i]
AP79 = [0.2742 - 0.0000i 0.2225 - 0.0000i 0.2074 - 0.0000i 0.2172 - 0.0000i 0.2239 - 0.0000i]
AP80 = [0.2740 - 0.0000i 0.2224 - 0.0000i 0.2073 - 0.0000i 0.2171 - 0.0000i 0.2239 - 0.0000i]
AP81 = [0.2738 - 0.0000i 0.2223 - 0.0000i 0.2072 - 0.0000i 0.2170 - 0.0000i 0.2238 - 0.0000i]
AP82 = [0.2737 - 0.0000i 0.2222 - 0.0000i 0.2071 - 0.0000i 0.2170 - 0.0000i 0.2238 - 0.0000i]
AP83 = [0.2736 - 0.0000i 0.2221 - 0.0000i 0.2071 - 0.0000i 0.2169 - 0.0000i 0.2237 - 0.0000i]
AP84 = [0.2734 - 0.0000i 0.2220 - 0.0000i 0.2070 - 0.0000i 0.2169 - 0.0000i 0.2237 - 0.0000i]
AP85 = [0.2733 - 0.0000i 0.2220 - 0.0000i 0.2070 - 0.0000i 0.2169 - 0.0000i 0.2237 - 0.0000i]
AP86 = [0.2733 - 0.0000i 0.2219 - 0.0000i 0.2070 - 0.0000i 0.2168 - 0.0000i 0.2236 - 0.0000i]
AP87 = [0.2732 - 0.0000i 0.2219 - 0.0000i 0.2069 - 0.0000i 0.2168 - 0.0000i 0.2236 - 0.0000i]
AP88 = [0.2731 - 0.0000i 0.2218 - 0.0000i 0.2069 - 0.0000i 0.2168 - 0.0000i 0.2236 - 0.0000i]
AP89 = [0.2731 - 0.0000i 0.2218 - 0.0000i 0.2069 - 0.0000i 0.2168 - 0.0000i 0.2236 - 0.0000i]

p-polarization values

RP1 = [0.6943 0.7588 0.7797 0.7721 0.7666]
RP2 = [0.6943 0.7588 0.7797 0.7721 0.7666]
RP3 = [0.6943 0.7588 0.7796 0.7721 0.7666]
RP4 = [0.6944 0.7588 0.7795 0.7720 0.7666]
RP5 = [0.6945 0.7588 0.7793 0.7720 0.7666]
RP6 = [0.6946 0.7589 0.7792 0.7719 0.7666]
RP7 = [0.6948 0.7589 0.7789 0.7719 0.7666]
RP8 = [0.6950 0.7589 0.7787 0.7718 0.7666]
RP9 = [0.6951 0.7589 0.7784 0.7717 0.7666]
RP10 = [0.6954 0.7589 0.7782 0.7716 0.7666]
RP11 = [0.6956 0.7589 0.7778 0.7715 0.7666]

RP12 = [0.6958 0.7589 0.7775 0.7714 0.7666]
RP13 = [0.6961 0.7589 0.7771 0.7713 0.7666]
RP14 = [0.6964 0.7589 0.7767 0.7712 0.7666]
RP15 = [0.6967 0.7589 0.7762 0.7710 0.7666]
RP16 = [0.6970 0.7589 0.7757 0.7709 0.7666]
RP17 = [0.6974 0.7589 0.7752 0.7707 0.7666]
RP18 = [0.6978 0.7590 0.7747 0.7706 0.7667]
RP19 = [0.6981 0.7590 0.7742 0.7704 0.7667]
RP20 = [0.6985 0.7590 0.7736 0.7702 0.7667]
RP21 = [0.6990 0.7590 0.7730 0.7700 0.7667]
RP22 = [0.6994 0.7590 0.7723 0.7698 0.7667]
RP23 = [0.6998 0.7589 0.7717 0.7696 0.7667]
RP24 = [0.7003 0.7589 0.7710 0.7694 0.7667]
RP25 = [0.7008 0.7589 0.7703 0.7692 0.7667]
RP26 = [0.7013 0.7589 0.7696 0.7690 0.7667]
RP27 = [0.7018 0.7589 0.7688 0.7687 0.7667]
RP28 = [0.7023 0.7589 0.7680 0.7685 0.7667]
RP29 = [0.7028 0.7588 0.7672 0.7683 0.7667]
RP30 = [0.7034 0.7588 0.7664 0.7680 0.7667]
RP31 = [0.7039 0.7588 0.7656 0.7677 0.7667]
RP32 = [0.7045 0.7587 0.7647 0.7675 0.7667]
RP33 = [0.7050 0.7587 0.7638 0.7672 0.7667]
RP34 = [0.7056 0.7586 0.7630 0.7669 0.7666]
RP35 = [0.7062 0.7586 0.7621 0.7666 0.7666]
RP36 = [0.7068 0.7585 0.7611 0.7664 0.7666]
RP37 = [0.7074 0.7584 0.7602 0.7661 0.7666]
RP38 = [0.7080 0.7584 0.7593 0.7658 0.7666]
RP39 = [0.7086 0.7583 0.7583 0.7655 0.7666]
RP40 = [0.7092 0.7582 0.7573 0.7652 0.7665]
RP41 = [0.7098 0.7581 0.7564 0.7649 0.7665]
RP42 = [0.7104 0.7580 0.7554 0.7645 0.7665]
RP43 = [0.7110 0.7579 0.7544 0.7642 0.7664]
RP44 = [0.7116 0.7578 0.7534 0.7639 0.7664]
RP45 = [0.7122 0.7576 0.7524 0.7636 0.7664]
RP46 = [0.7128 0.7575 0.7514 0.7633 0.7663]
RP47 = [0.7134 0.7574 0.7504 0.7630 0.7663]
RP48 = [0.7140 0.7572 0.7494 0.7626 0.7662]
RP49 = [0.7146 0.7571 0.7484 0.7623 0.7662]
RP50 = [0.7152 0.7569 0.7474 0.7620 0.7661]
RP51 = [0.7158 0.7568 0.7464 0.7617 0.7661]
RP52 = [0.7163 0.7566 0.7454 0.7613 0.7660]
RP53 = [0.7169 0.7564 0.7444 0.7610 0.7660]
RP54 = [0.7175 0.7562 0.7434 0.7607 0.7659]
RP55 = [0.7180 0.7561 0.7424 0.7604 0.7658]
RP56 = [0.7186 0.7559 0.7414 0.7601 0.7658]
RP57 = [0.7191 0.7557 0.7405 0.7598 0.7657]
RP58 = [0.7196 0.7555 0.7395 0.7595 0.7657]
RP59 = [0.7201 0.7553 0.7386 0.7592 0.7656]
RP60 = [0.7206 0.7551 0.7377 0.7589 0.7655]
RP61 = [0.7211 0.7549 0.7368 0.7586 0.7655]
RP62 = [0.7216 0.7547 0.7359 0.7583 0.7654]

RP63 = [0.7221 0.7545 0.7351 0.7580 0.7653]
RP64 = [0.7225 0.7543 0.7342 0.7577 0.7652]
RP65 = [0.7230 0.7541 0.7334 0.7574 0.7652]
RP66 = [0.7234 0.7539 0.7326 0.7572 0.7651]
RP67 = [0.7238 0.7537 0.7318 0.7569 0.7650]
RP68 = [0.7242 0.7535 0.7311 0.7567 0.7650]
RP69 = [0.7246 0.7533 0.7303 0.7564 0.7649]
RP70 = [0.7249 0.7531 0.7296 0.7562 0.7648]
RP71 = [0.7253 0.7530 0.7290 0.7560 0.7648]
RP72 = [0.7256 0.7528 0.7283 0.7558 0.7647]
RP73 = [0.7259 0.7526 0.7277 0.7556 0.7647]
RP74 = [0.7262 0.7524 0.7271 0.7554 0.7646]
RP75 = [0.7265 0.7523 0.7265 0.7552 0.7645]
RP76 = [0.7268 0.7521 0.7260 0.7550 0.7645]
RP77 = [0.7270 0.7520 0.7255 0.7548 0.7644]
RP78 = [0.7272 0.7519 0.7251 0.7547 0.7644]
RP79 = [0.7275 0.7517 0.7247 0.7545 0.7644]
RP80 = [0.7276 0.7516 0.7243 0.7544 0.7643]
RP81 = [0.7278 0.7515 0.7239 0.7543 0.7643]
RP82 = [0.7280 0.7514 0.7236 0.7542 0.7642]
RP83 = [0.7281 0.7513 0.7233 0.7541 0.7642]
RP84 = [0.7282 0.7512 0.7231 0.7540 0.7642]
RP85 = [0.7283 0.7512 0.7229 0.7539 0.7642]
RP86 = [0.7284 0.7511 0.7227 0.7539 0.7641]
RP87 = [0.7285 0.7511 0.7226 0.7538 0.7641]
RP88 = [0.7285 0.7511 0.7225 0.7538 0.7641]
RP89 = [0.7286 0.7510 0.7224 0.7538 0.7641]

AP1 = [0.3057 - 0.0000i 0.2412 - 0.0000i 0.2203 - 0.0000i 0.2279 - 0.0000i 0.2334 - 0.0000i]
AP2 = [0.3057 - 0.0000i 0.2412 - 0.0000i 0.2203 - 0.0000i 0.2279 - 0.0000i 0.2334 - 0.0000i]
AP3 = [0.3057 - 0.0000i 0.2412 - 0.0000i 0.2204 - 0.0000i 0.2279 - 0.0000i 0.2334 - 0.0000i]
AP4 = [0.3056 - 0.0000i 0.2412 - 0.0000i 0.2205 - 0.0000i 0.2280 - 0.0000i 0.2334 - 0.0000i]
AP5 = [0.3055 - 0.0000i 0.2412 - 0.0000i 0.2207 - 0.0000i 0.2280 - 0.0000i 0.2334 - 0.0000i]
AP6 = [0.3054 - 0.0000i 0.2411 - 0.0000i 0.2208 - 0.0000i 0.2281 - 0.0000i 0.2334 - 0.0000i]
AP7 = [0.3052 - 0.0000i 0.2411 - 0.0000i 0.2211 - 0.0000i 0.2281 - 0.0000i 0.2334 - 0.0000i]
AP8 = [0.3050 - 0.0000i 0.2411 - 0.0000i 0.2213 - 0.0000i 0.2282 - 0.0000i 0.2334 - 0.0000i]
AP9 = [0.3049 - 0.0000i 0.2411 - 0.0000i 0.2216 - 0.0000i 0.2283 - 0.0000i 0.2334 - 0.0000i]
AP10 = [0.3046 - 0.0000i 0.2411 - 0.0000i 0.2218 - 0.0000i 0.2284 - 0.0000i 0.2334 - 0.0000i]
AP11 = [0.3044 - 0.0000i 0.2411 - 0.0000i 0.2222 - 0.0000i 0.2285 - 0.0000i 0.2334 - 0.0000i]
AP12 = [0.3042 - 0.0000i 0.2411 - 0.0000i 0.2225 - 0.0000i 0.2286 - 0.0000i 0.2334 - 0.0000i]
AP13 = [0.3039 - 0.0000i 0.2411 - 0.0000i 0.2229 - 0.0000i 0.2287 - 0.0000i 0.2334 - 0.0000i]
AP14 = [0.3036 - 0.0000i 0.2411 - 0.0000i 0.2233 - 0.0000i 0.2288 - 0.0000i 0.2334 - 0.0000i]
AP15 = [0.3033 - 0.0000i 0.2411 - 0.0000i 0.2238 - 0.0000i 0.2290 - 0.0000i 0.2334 - 0.0000i]
AP16 = [0.3030 - 0.0000i 0.2411 - 0.0000i 0.2243 - 0.0000i 0.2291 - 0.0000i 0.2334 - 0.0000i]
AP17 = [0.3026 - 0.0000i 0.2411 - 0.0000i 0.2248 - 0.0000i 0.2293 - 0.0000i 0.2334 - 0.0000i]
AP18 = [0.3022 - 0.0000i 0.2410 - 0.0000i 0.2253 - 0.0000i 0.2294 - 0.0000i 0.2333 - 0.0000i]
AP19 = [0.3019 - 0.0000i 0.2410 - 0.0000i 0.2258 - 0.0000i 0.2296 - 0.0000i 0.2333 - 0.0000i]
AP20 = [0.3015 - 0.0000i 0.2410 - 0.0000i 0.2264 - 0.0000i 0.2298 - 0.0000i 0.2333 - 0.0000i]
AP21 = [0.3010 - 0.0000i 0.2410 - 0.0000i 0.2270 - 0.0000i 0.2300 - 0.0000i 0.2333 - 0.0000i]
AP22 = [0.3006 - 0.0000i 0.2410 - 0.0000i 0.2277 - 0.0000i 0.2302 - 0.0000i 0.2333 - 0.0000i]
AP23 = [0.3002 - 0.0000i 0.2411 - 0.0000i 0.2283 - 0.0000i 0.2304 - 0.0000i 0.2333 - 0.0000i]

AP24 = [0.2997 - 0.0000i   0.2411 - 0.0000i   0.2290 - 0.0000i   0.2306 - 0.0000i   0.2333 - 0.0000i]
AP25 = [0.2992 - 0.0000i   0.2411 - 0.0000i   0.2297 - 0.0000i   0.2308 - 0.0000i   0.2333 - 0.0000i]
AP26 = [0.2987 - 0.0000i   0.2411 - 0.0000i   0.2304 - 0.0000i   0.2310 - 0.0000i   0.2333 - 0.0000i]
AP27 = [0.2982 - 0.0000i   0.2411 - 0.0000i   0.2312 - 0.0000i   0.2313 - 0.0000i   0.2333 - 0.0000i]
AP28 = [0.2977 - 0.0000i   0.2411 - 0.0000i   0.2320 - 0.0000i   0.2315 - 0.0000i   0.2333 - 0.0000i]
AP29 = [0.2972 - 0.0000i   0.2412 - 0.0000i   0.2328 - 0.0000i   0.2317 - 0.0000i   0.2333 - 0.0000i]
AP30 = [0.2966 - 0.0000i   0.2412 - 0.0000i   0.2336 - 0.0000i   0.2320 - 0.0000i   0.2333 - 0.0000i]
AP31 = [0.2961 - 0.0000i   0.2412 - 0.0000i   0.2344 - 0.0000i   0.2323 - 0.0000i   0.2333 - 0.0000i]
AP32 = [0.2955 - 0.0000i   0.2413 - 0.0000i   0.2353 - 0.0000i   0.2325 - 0.0000i   0.2333 - 0.0000i]
AP33 = [0.2950 - 0.0000i   0.2413 - 0.0000i   0.2362 - 0.0000i   0.2328 - 0.0000i   0.2333 - 0.0000i]
AP34 = [0.2944 - 0.0000i   0.2414 - 0.0000i   0.2370 - 0.0000i   0.2331 - 0.0000i   0.2334 - 0.0000i]
AP35 = [0.2938 - 0.0000i   0.2414 - 0.0000i   0.2379 - 0.0000i   0.2334 - 0.0000i   0.2334 - 0.0000i]
AP36 = [0.2932 - 0.0000i   0.2415 - 0.0000i   0.2389 - 0.0000i   0.2336 - 0.0000i   0.2334 - 0.0000i]
AP37 = [0.2926 - 0.0000i   0.2416 - 0.0000i   0.2398 - 0.0000i   0.2339 - 0.0000i   0.2334 - 0.0000i]
AP38 = [0.2920 - 0.0000i   0.2416 - 0.0000i   0.2407 - 0.0000i   0.2342 - 0.0000i   0.2334 - 0.0000i]
AP39 = [0.2914 - 0.0000i   0.2417 - 0.0000i   0.2417 - 0.0000i   0.2345 - 0.0000i   0.2334 - 0.0000i]
AP40 = [0.2908 - 0.0000i   0.2418 - 0.0000i   0.2427 - 0.0000i   0.2348 - 0.0000i   0.2335 - 0.0000i]
AP41 = [0.2902 - 0.0000i   0.2419 - 0.0000i   0.2436 - 0.0000i   0.2351 - 0.0000i   0.2335 - 0.0000i]
AP42 = [0.2896 - 0.0000i   0.2420 - 0.0000i   0.2446 - 0.0000i   0.2355 - 0.0000i   0.2335 - 0.0000i]
AP43 = [0.2890 - 0.0000i   0.2421 - 0.0000i   0.2456 - 0.0000i   0.2358 - 0.0000i   0.2336 - 0.0000i]
AP44 = [0.2884 - 0.0000i   0.2422 - 0.0000i   0.2466 - 0.0000i   0.2361 - 0.0000i   0.2336 - 0.0000i]
AP45 = [0.2878 - 0.0000i   0.2424 - 0.0000i   0.2476 - 0.0000i   0.2364 - 0.0000i   0.2336 - 0.0000i]
AP46 = [0.2872 - 0.0000i   0.2425 - 0.0000i   0.2486 - 0.0000i   0.2367 - 0.0000i   0.2337 - 0.0000i]
AP47 = [0.2866 - 0.0000i   0.2426 - 0.0000i   0.2496 - 0.0000i   0.2370 - 0.0000i   0.2337 - 0.0000i]
AP48 = [0.2860 - 0.0000i   0.2428 - 0.0000i   0.2506 - 0.0000i   0.2374 - 0.0000i   0.2338 - 0.0000i]
AP49 = [0.2854 - 0.0000i   0.2429 - 0.0000i   0.2516 - 0.0000i   0.2377 - 0.0000i   0.2338 - 0.0000i]
AP50 = [0.2848 - 0.0000i   0.2431 - 0.0000i   0.2526 - 0.0000i   0.2380 - 0.0000i   0.2339 - 0.0000i]
AP51 = [0.2842 - 0.0000i   0.2432 - 0.0000i   0.2536 - 0.0000i   0.2383 - 0.0000i   0.2339 - 0.0000i]
AP52 = [0.2837 - 0.0000i   0.2434 - 0.0000i   0.2546 - 0.0000i   0.2387 - 0.0000i   0.2340 - 0.0000i]
AP53 = [0.2831 - 0.0000i   0.2436 - 0.0000i   0.2556 - 0.0000i   0.2390 - 0.0000i   0.2340 - 0.0000i]
AP54 = [0.2825 - 0.0000i   0.2438 - 0.0000i   0.2566 - 0.0000i   0.2393 - 0.0000i   0.2341 - 0.0000i]
AP55 = [0.2820 - 0.0000i   0.2439 - 0.0000i   0.2576 - 0.0000i   0.2396 - 0.0000i   0.2342 - 0.0000i]
AP56 = [0.2814 - 0.0000i   0.2441 - 0.0000i   0.2586 - 0.0000i   0.2399 - 0.0000i   0.2342 - 0.0000i]
AP57 = [0.2809 - 0.0000i   0.2443 - 0.0000i   0.2595 - 0.0000i   0.2402 - 0.0000i   0.2343 - 0.0000i]
AP58 = [0.2804 - 0.0000i   0.2445 - 0.0000i   0.2605 - 0.0000i   0.2405 - 0.0000i   0.2343 - 0.0000i]
AP59 = [0.2799 - 0.0000i   0.2447 - 0.0000i   0.2614 - 0.0000i   0.2408 - 0.0000i   0.2344 - 0.0000i]
AP60 = [0.2794 - 0.0000i   0.2449 - 0.0000i   0.2623 - 0.0000i   0.2411 - 0.0000i   0.2345 - 0.0000i]
AP61 = [0.2789 - 0.0000i   0.2451 - 0.0000i   0.2632 - 0.0000i   0.2414 - 0.0000i   0.2345 - 0.0000i]
AP62 = [0.2784 - 0.0000i   0.2453 - 0.0000i   0.2641 - 0.0000i   0.2417 - 0.0000i   0.2346 - 0.0000i]
AP63 = [0.2779 - 0.0000i   0.2455 - 0.0000i   0.2649 - 0.0000i   0.2420 - 0.0000i   0.2347 - 0.0000i]
AP64 = [0.2775 - 0.0000i   0.2457 - 0.0000i   0.2658 - 0.0000i   0.2423 - 0.0000i   0.2348 - 0.0000i]
AP65 = [0.2770 - 0.0000i   0.2459 - 0.0000i   0.2666 - 0.0000i   0.2426 - 0.0000i   0.2348 - 0.0000i]
AP66 = [0.2766 - 0.0000i   0.2461 - 0.0000i   0.2674 - 0.0000i   0.2428 - 0.0000i   0.2349 - 0.0000i]
AP67 = [0.2762 - 0.0000i   0.2463 - 0.0000i   0.2682 - 0.0000i   0.2431 - 0.0000i   0.2350 - 0.0000i]
AP68 = [0.2758 - 0.0000i   0.2465 - 0.0000i   0.2689 - 0.0000i   0.2433 - 0.0000i   0.2350 - 0.0000i]
AP69 = [0.2754 - 0.0000i   0.2467 - 0.0000i   0.2697 - 0.0000i   0.2436 - 0.0000i   0.2351 - 0.0000i]
AP70 = [0.2751 - 0.0000i   0.2469 - 0.0000i   0.2704 - 0.0000i   0.2438 - 0.0000i   0.2352 - 0.0000i]
AP71 = [0.2747 - 0.0000i   0.2470 - 0.0000i   0.2710 - 0.0000i   0.2440 - 0.0000i   0.2352 - 0.0000i]
AP72 = [0.2744 - 0.0000i   0.2472 - 0.0000i   0.2717 - 0.0000i   0.2442 - 0.0000i   0.2353 - 0.0000i]
AP73 = [0.2741 - 0.0000i   0.2474 - 0.0000i   0.2723 - 0.0000i   0.2444 - 0.0000i   0.2353 - 0.0000i]
AP74 = [0.2738 - 0.0000i   0.2476 - 0.0000i   0.2729 - 0.0000i   0.2446 - 0.0000i   0.2354 - 0.0000i]

AP75 = [0.2735 - 0.0000i 0.2477 - 0.0000i 0.2735 - 0.0000i 0.2448 - 0.0000i 0.2355 - 0.0000i]
AP76 = [0.2732 - 0.0000i 0.2479 - 0.0000i 0.2740 - 0.0000i 0.2450 - 0.0000i 0.2355 - 0.0000i]
AP77 = [0.2730 - 0.0000i 0.2480 - 0.0000i 0.2745 - 0.0000i 0.2452 - 0.0000i 0.2356 - 0.0000i]
AP78 = [0.2728 - 0.0000i 0.2481 - 0.0000i 0.2749 - 0.0000i 0.2453 - 0.0000i 0.2356 - 0.0000i]
AP79 = [0.2725 - 0.0000i 0.2483 - 0.0000i 0.2753 - 0.0000i 0.2455 - 0.0000i 0.2356 - 0.0000i]
AP80 = [0.2724 - 0.0000i 0.2484 - 0.0000i 0.2757 - 0.0000i 0.2456 - 0.0000i 0.2357 - 0.0000i]
AP81 = [0.2722 - 0.0000i 0.2485 - 0.0000i 0.2761 - 0.0000i 0.2457 - 0.0000i 0.2357 - 0.0000i]
AP82 = [0.2720 - 0.0000i 0.2486 - 0.0000i 0.2764 - 0.0000i 0.2458 - 0.0000i 0.2358 - 0.0000i]
AP83 = [0.2719 - 0.0000i 0.2487 - 0.0000i 0.2767 - 0.0000i 0.2459 - 0.0000i 0.2358 - 0.0000i]
AP84 = [0.2718 - 0.0000i 0.2488 - 0.0000i 0.2769 - 0.0000i 0.2460 - 0.0000i 0.2358 - 0.0000i]
AP85 = [0.2717 - 0.0000i 0.2488 - 0.0000i 0.2771 - 0.0000i 0.2461 - 0.0000i 0.2358 - 0.0000i]
AP86 = [0.2716 - 0.0000i 0.2489 - 0.0000i 0.2773 - 0.0000i 0.2461 - 0.0000i 0.2359 - 0.0000i]
AP87 = [0.2715 - 0.0000i 0.2489 - 0.0000i 0.2774 - 0.0000i 0.2462 - 0.0000i 0.2359 - 0.0000i]
AP88 = [0.2715 - 0.0000i 0.2489 - 0.0000i 0.2775 - 0.0000i 0.2462 - 0.0000i 0.2359 - 0.0000i]
AP89 = [0.2714 - 0.0000i 0.2490 - 0.0000i 0.2776 - 0.0000i 0.2462 - 0.0000i 0.2359 - 0.0000i]

Simulation values of Matlab for Sensor Structure 4

s-polarization values

RP1 = [0.4234 0.2775 0.9761 0.9931 0.6814 0.9835 0.9980 0.9839 0.9571 0.8656]
RP2 = [0.4246 0.2671 0.9761 0.9930 0.6858 0.9836 0.9980 0.9838 0.9570 0.8654]
RP3 = [0.4266 0.2508 0.9762 0.9929 0.6931 0.9837 0.9980 0.9838 0.9569 0.8651]
RP4 = [0.4293 0.2303 0.9763 0.9927 0.7028 0.9840 0.9980 0.9837 0.9568 0.8647]
RP5 = [0.4328 0.2082 0.9765 0.9924 0.7147 0.9843 0.9980 0.9836 0.9566 0.8642]
RP6 = [0.4371 0.1884 0.9767 0.9920 0.7285 0.9847 0.9980 0.9834 0.9564 0.8636]
RP7 = [0.4421 0.1754 0.9770 0.9915 0.7437 0.9851 0.9980 0.9832 0.9562 0.8629]
RP8 = [0.4479 0.1742 0.9772 0.9909 0.7598 0.9855 0.9980 0.9830 0.9559 0.8620]
RP9 = [0.4544 0.1881 0.9775 0.9902 0.7765 0.9861 0.9980 0.9828 0.9555 0.8610]
RP10 = [0.4616 0.2185 0.9779 0.9893 0.7934 0.9866 0.9980 0.9825 0.9552 0.8600]
RP11 = [0.4695 0.2633 0.9782 0.9882 0.8101 0.9872 0.9979 0.9823 0.9548 0.8587]
RP12 = [0.4780 0.3185 0.9786 0.9869 0.8263 0.9878 0.9979 0.9819 0.9543 0.8574]
RP13 = [0.4870 0.3789 0.9791 0.9853 0.8418 0.9885 0.9979 0.9816 0.9538 0.8559]
RP14 = [0.4967 0.4398 0.9795 0.9832 0.8565 0.9891 0.9978 0.9812 0.9533 0.8543]
RP15 = [0.5068 0.4978 0.9800 0.9806 0.8702 0.9897 0.9978 0.9808 0.9528 0.8526]
RP16 = [0.5174 0.5510 0.9806 0.9773 0.8829 0.9904 0.9977 0.9804 0.9521 0.8507]
RP17 = [0.5283 0.5983 0.9811 0.9731 0.8946 0.9911 0.9976 0.9799 0.9515 0.8486]
RP18 = [0.5396 0.6398 0.9817 0.9677 0.9052 0.9917 0.9975 0.9795 0.9508 0.8464]
RP19 = [0.5512 0.6759 0.9823 0.9604 0.9149 0.9923 0.9974 0.9789 0.9501 0.8441]
RP20 = [0.5630 0.7070 0.9829 0.9506 0.9236 0.9929 0.9973 0.9784 0.9493 0.8415]
RP21 = [0.5750 0.7338 0.9836 0.9371 0.9315 0.9935 0.9972 0.9778 0.9485 0.8388]
RP22 = [0.5871 0.7569 0.9843 0.9177 0.9386 0.9941 0.9970 0.9772 0.9477 0.8359]
RP23 = [0.5993 0.7769 0.9850 0.8891 0.9449 0.9946 0.9968 0.9765 0.9468 0.8328]
RP24 = [0.6116 0.7943 0.9857 0.8452 0.9506 0.9952 0.9967 0.9759 0.9458 0.8295]
RP25 = [0.6239 0.8095 0.9865 0.7754 0.9557 0.9956 0.9965 0.9752 0.9448 0.8260]
RP26 = [0.6363 0.8228 0.9873 0.6613 0.9603 0.9961 0.9962 0.9744 0.9438 0.8222]
RP27 = [0.6486 0.8345 0.9881 0.4801 0.9644 0.9965 0.9960 0.9736 0.9427 0.8182]
RP28 = [0.6609 0.8449 0.9889 0.2471 0.9680 0.9969 0.9957 0.9728 0.9416 0.8139]
RP29 = [0.6731 0.8542 0.9898 0.1162 0.9713 0.9973 0.9954 0.9720 0.9405 0.8093]
RP30 = [0.6854 0.8625 0.9907 0.2309 0.9742 0.9976 0.9951 0.9711 0.9393 0.8043]

```
RP31 = [0.6976   0.8700   0.9915   0.4456   0.9768   0.9979   0.9948   0.9703   0.9380   0.7990]
RP32 = [0.7098   0.8767   0.9924   0.6174   0.9792   0.9982   0.9945   0.9693   0.9367   0.7934]
RP33 = [0.7221   0.8829   0.9932   0.7302   0.9813   0.9984   0.9941   0.9684   0.9354   0.7873]
RP34 = [0.7344   0.8886   0.9939   0.8023   0.9832   0.9986   0.9937   0.9674   0.9340   0.7807]
RP35 = [0.7468   0.8938   0.9944   0.8496   0.9849   0.9988   0.9933   0.9664   0.9326   0.7737]
RP36 = [0.7594   0.8986   0.9946   0.8819   0.9864   0.9989   0.9929   0.9653   0.9311   0.7660]
RP37 = [0.7721   0.9031   0.9940   0.9047   0.9878   0.9991   0.9925   0.9643   0.9296   0.7577]
RP38 = [0.7852   0.9072   0.9922   0.9213   0.9891   0.9991   0.9920   0.9632   0.9280   0.7487]
RP39 = [0.7985   0.9112   0.9878   0.9338   0.9902   0.9992   0.9915   0.9620   0.9264   0.7389]
RP40 = [0.8124   0.9149   0.9776   0.9435   0.9912   0.9992   0.9910   0.9609   0.9247   0.7282]
RP41 = [0.8268   0.9185   0.9538   0.9511   0.9921   0.9993   0.9905   0.9597   0.9229   0.7164]
RP42 = [0.8419   0.9219   0.8924   0.9572   0.9930   0.9993   0.9900   0.9585   0.9211   0.7034]
RP43 = [0.8579   0.9252   0.7138   0.9622   0.9937   0.9992   0.9895   0.9573   0.9193   0.6890]
RP44 = [0.8749   0.9284   0.2833   0.9664   0.9944   0.9992   0.9889   0.9560   0.9174   0.6731]
RP45 = [0.8931   0.9315   0.2396   0.9698   0.9950   0.9991   0.9884   0.9548   0.9154   0.6553]
RP46 = [0.9126   0.9347   0.5682   0.9728   0.9955   0.9990   0.9878   0.9535   0.9134   0.6354]
RP47 = [0.9332   0.9378   0.7423   0.9753   0.9960   0.9989   0.9872   0.9522   0.9113   0.6129]
RP48 = [0.9544   0.9409   0.8252   0.9774   0.9965   0.9988   0.9866   0.9509   0.9092   0.5876]
RP49 = [0.9741   0.9442   0.8699   0.9793   0.9969   0.9987   0.9860   0.9495   0.9069   0.5588]
RP50 = [0.9875   0.9476   0.8967   0.9810   0.9972   0.9985   0.9854   0.9482   0.9046   0.5260]
RP51 = [0.9823   0.9511   0.9142   0.9824   0.9976   0.9984   0.9848   0.9468   0.9023   0.4886]
RP52 = [0.9330   0.9549   0.9264   0.9837   0.9979   0.9982   0.9841   0.9454   0.8998   0.4461]
RP53 = [0.8017   0.9589   0.9354   0.9849   0.9981   0.9980   0.9835   0.9441   0.8973   0.3977]
RP54 = [0.5879   0.9632   0.9422   0.9859   0.9984   0.9978   0.9828   0.9427   0.8947   0.3433]
RP55 = [0.3946   0.9676   0.9475   0.9869   0.9986   0.9976   0.9822   0.9413   0.8920   0.2833]
RP56 = [0.3156   0.9708   0.9518   0.9877   0.9988   0.9974   0.9816   0.9399   0.8893   0.2193]
RP57 = [0.3255   0.9684   0.9553   0.9885   0.9989   0.9972   0.9809   0.9385   0.8864   0.1549]
RP58 = [0.3696   0.9360   0.9583   0.9892   0.9991   0.9970   0.9803   0.9371   0.8834   0.0964]
RP59 = [0.4187   0.6996   0.9608   0.9898   0.9992   0.9968   0.9796   0.9357   0.8804   0.0536]
RP60 = [0.4633   0.1306   0.9629   0.9904   0.9993   0.9965   0.9790   0.9343   0.8772   0.0373]
RP61 = [0.5013   0.5617   0.9648   0.9909   0.9994   0.9963   0.9784   0.9329   0.8739   0.0563]
RP62 = [0.5332   0.7445   0.9664   0.9914   0.9995   0.9961   0.9777   0.9316   0.8705   0.1120]
RP63 = [0.5600   0.8153   0.9679   0.9918   0.9996   0.9958   0.9771   0.9302   0.8670   0.1969]
RP64 = [0.5826   0.8505   0.9691   0.9922   0.9996   0.9956   0.9765   0.9289   0.8633   0.2974]
RP65 = [0.6018   0.8712   0.9703   0.9926   0.9997   0.9954   0.9759   0.9275   0.8595   0.3996]
RP66 = [0.6183   0.8847   0.9713   0.9930   0.9997   0.9951   0.9753   0.9262   0.8556   0.4936]
RP67 = [0.6327   0.8942   0.9723   0.9933   0.9998   0.9949   0.9747   0.9250   0.8515   0.5748]
RP68 = [0.6452   0.9012   0.9731   0.9936   0.9998   0.9947   0.9742   0.9237   0.8473   0.6419]
RP69 = [0.6561   0.9067   0.9739   0.9938   0.9998   0.9945   0.9736   0.9225   0.8430   0.6960]
RP70 = [0.6658   0.9111   0.9746   0.9941   0.9998   0.9942   0.9731   0.9213   0.8385   0.7390]
RP71 = [0.6744   0.9146   0.9752   0.9943   0.9998   0.9940   0.9726   0.9201   0.8340   0.7730]
RP72 = [0.6821   0.9176   0.9758   0.9945   0.9998   0.9938   0.9721   0.9190   0.8293   0.7997]
RP73 = [0.6890   0.9201   0.9763   0.9947   0.9998   0.9936   0.9716   0.9179   0.8244   0.8207]
RP74 = [0.6951   0.9222   0.9768   0.9949   0.9998   0.9934   0.9711   0.9169   0.8195   0.8373]
RP75 = [0.3334   0.1738   0.2500   0.3979   0.5432   0.5131   0.4745   0.4080   0.2722   0.2607]
RP76 = [0.7055   0.9257   0.9776   0.9952   0.9998   0.9931   0.9703   0.9149   0.8096   0.8607]
RP77 = [0.7099   0.9271   0.9780   0.9954   0.9998   0.9929   0.9699   0.9140   0.8046   0.8689]
RP78 = [0.7139   0.9283   0.9783   0.9955   0.9998   0.9928   0.9695   0.9132   0.7996   0.8754]
RP79 = [0.7174   0.9294   0.9786   0.9956   0.9998   0.9926   0.9692   0.9124   0.7947   0.8806]
RP80 = [0.7205   0.9303   0.9789   0.9957   0.9998   0.9925   0.9689   0.9117   0.7899   0.8847]
RP81 = [0.7233   0.9311   0.9791   0.9958   0.9998   0.9924   0.9686   0.9110   0.7854   0.8879]
```

RP82 = [0.7257 0.9318 0.9793 0.9959 0.9998 0.9923 0.9683 0.9104 0.7810 0.8905]
RP83 = [0.7278 0.9324 0.9795 0.9959 0.9998 0.9922 0.9681 0.9099 0.7770 0.8926]
RP84 = [0.7296 0.9329 0.9796 0.9960 0.9998 0.9921 0.9679 0.9094 0.7734 0.8942]
RP85 = [0.7310 0.9333 0.9798 0.9960 0.9998 0.9920 0.9677 0.9090 0.7702 0.8954]
RP86 = [0.7322 0.9337 0.9799 0.9961 0.9997 0.9919 0.9676 0.9087 0.7674 0.8964]
RP87 = [0.7332 0.9339 0.9799 0.9961 0.9997 0.9919 0.9675 0.9084 0.7653 0.8971]
RP88 = [0.7338 0.9341 0.9800 0.9961 0.9997 0.9919 0.9674 0.9083 0.7637 0.8975]
RP89 = [0.7342 0.9342 0.9800 0.9961 0.9997 0.9918 0.9674 0.9081 0.7627 0.8978]

AP1 = [0.5766 - 0.0000i 0.7225 - 0.0000i 0.0239 - 0.0000i 0.0069 - 0.0000i 0.3186 - 0.0000i 0.0165 - 0.0000i 0.0020 - 0.0000i 0.0161 - 0.0000i 0.0429 - 0.0000i 0.1344 - 0.0000i]
AP2 = [0.5754 - 0.0000i 0.7329 - 0.0000i 0.0239 - 0.0000i 0.0070 - 0.0000i 0.3142 - 0.0000i 0.0164 - 0.0000i 0.0020 - 0.0000i 0.0162 - 0.0000i 0.0430 - 0.0000i 0.1346 - 0.0000i]
AP3 = [0.5734 - 0.0000i 0.7492 - 0.0000i 0.0238 - 0.0000i 0.0071 - 0.0000i 0.3069 - 0.0000i 0.0163 - 0.0000i 0.0020 - 0.0000i 0.0162 - 0.0000i 0.0431 - 0.0000i 0.1349 - 0.0000i]
AP4 = [0.5707 - 0.0000i 0.7697 - 0.0000i 0.0237 - 0.0000i 0.0073 - 0.0000i 0.2972 - 0.0000i 0.0160 - 0.0000i 0.0020 - 0.0000i 0.0163 - 0.0000i 0.0432 - 0.0000i 0.1353 - 0.0000i]
AP5 = [0.5672 - 0.0000i 0.7918 - 0.0000i 0.0235 - 0.0000i 0.0076 - 0.0000i 0.2853 - 0.0000i 0.0157 - 0.0000i 0.0020 - 0.0000i 0.0164 - 0.0000i 0.0434 - 0.0000i 0.1358 - 0.0000i]
AP6 = [0.5629 - 0.0000i 0.8116 - 0.0000i 0.0233 - 0.0000i 0.0080 - 0.0000i 0.2715 - 0.0000i 0.0153 - 0.0000i 0.0020 - 0.0000i 0.0166 - 0.0000i 0.0436 - 0.0000i 0.1364 - 0.0000i]
AP7 = [0.5579 - 0.0000i 0.8246 - 0.0000i 0.0230 - 0.0000i 0.0085 - 0.0000i 0.2563 - 0.0000i 0.0149 - 0.0000i 0.0020 - 0.0000i 0.0168 - 0.0000i 0.0438 - 0.0000i 0.1371 - 0.0000i]
AP8 = [0.5521 - 0.0000i 0.8258 - 0.0000i 0.0228 - 0.0000i 0.0091 - 0.0000i 0.2402 - 0.0000i 0.0145 - 0.0000i 0.0020 - 0.0000i 0.0170 - 0.0000i 0.0441 - 0.0000i 0.1380 - 0.0000i]
AP9 = [0.5456 - 0.0000i 0.8119 - 0.0000i 0.0225 - 0.0000i 0.0098 - 0.0000i 0.2235 - 0.0000i 0.0139 - 0.0000i 0.0020 - 0.0000i 0.0172 - 0.0000i 0.0445 - 0.0000i 0.1390 - 0.0000i]
AP10 = [0.5384 - 0.0000i 0.7815 - 0.0000i 0.0221 - 0.0000i 0.0107 - 0.0000i 0.2066 - 0.0000i 0.0134 - 0.0000i 0.0020 - 0.0000i 0.0175 - 0.0000i 0.0448 - 0.0000i 0.1400 - 0.0000i]
AP11 = [0.5305 - 0.0000i 0.7367 - 0.0000i 0.0218 - 0.0000i 0.0118 - 0.0000i 0.1899 - 0.0000i 0.0128 - 0.0000i 0.0021 - 0.0000i 0.0177 - 0.0000i 0.0452 - 0.0000i 0.1413 - 0.0000i]
AP12 = [0.5220 - 0.0000i 0.6815 - 0.0000i 0.0214 - 0.0000i 0.0131 - 0.0000i 0.1737 - 0.0000i 0.0122 - 0.0000i 0.0021 - 0.0000i 0.0181 - 0.0000i 0.0457 - 0.0000i 0.1426 - 0.0000i]
AP13 = [0.5130 - 0.0000i 0.6211 - 0.0000i 0.0209 - 0.0000i 0.0147 - 0.0000i 0.1582 - 0.0000i 0.0115 - 0.0000i 0.0021 - 0.0000i 0.0184 - 0.0000i 0.0462 - 0.0000i 0.1441 - 0.0000i]
AP14 = [0.5033 - 0.0000i 0.5602 - 0.0000i 0.0205 - 0.0000i 0.0168 - 0.0000i 0.1435 - 0.0000i 0.0109 - 0.0000i 0.0022 - 0.0000i 0.0188 - 0.0000i 0.0467 - 0.0000i 0.1457 - 0.0000i]
AP15 = [0.4932 - 0.0000i 0.5022 - 0.0000i 0.0200 - 0.0000i 0.0194 - 0.0000i 0.1298 - 0.0000i 0.0103 - 0.0000i 0.0022 - 0.0000i 0.0192 - 0.0000i 0.0472 - 0.0000i 0.1474 - 0.0000i]
AP16 = [0.4826 - 0.0000i 0.4490 - 0.0000i 0.0194 - 0.0000i 0.0227 - 0.0000i 0.1171 - 0.0000i 0.0096 - 0.0000i 0.0023 - 0.0000i 0.0196 - 0.0000i 0.0479 - 0.0000i 0.1493 - 0.0000i]
AP17 = [0.4717 - 0.0000i 0.4017 - 0.0000i 0.0189 - 0.0000i 0.0269 - 0.0000i 0.1054 - 0.0000i 0.0089 - 0.0000i 0.0024 - 0.0000i 0.0201 - 0.0000i 0.0485 - 0.0000i 0.1514 - 0.0000i]
AP18 = [0.4604 - 0.0000i 0.3602 - 0.0000i 0.0183 - 0.0000i 0.0323 - 0.0000i 0.0948 - 0.0000i 0.0083 - 0.0000i 0.0025 - 0.0000i 0.0205 - 0.0000i 0.0492 - 0.0000i 0.1536 - 0.0000i]
AP19 = [0.4488 - 0.0000i 0.3241 - 0.0000i 0.0177 - 0.0000i 0.0396 - 0.0000i 0.0851 - 0.0000i 0.0077 - 0.0000i 0.0026 - 0.0000i 0.0211 - 0.0000i 0.0499 - 0.0000i 0.1559 - 0.0000i]
AP20 = [0.4370 - 0.0000i 0.2930 - 0.0000i 0.0171 - 0.0000i 0.0494 - 0.0000i 0.0764 - 0.0000i 0.0071 - 0.0000i 0.0027 - 0.0000i 0.0216 - 0.0000i 0.0507 - 0.0000i 0.1585 - 0.0000i]
AP21 = [0.4250 - 0.0000i 0.2662 - 0.0000i 0.0164 - 0.0000i 0.0629 - 0.0000i 0.0685 - 0.0000i 0.0065 - 0.0000i 0.0028 - 0.0000i 0.0222 - 0.0000i 0.0515 - 0.0000i 0.1612 - 0.0000i]

AP22 = [0.4129 - 0.0000i 0.2431 - 0.0000i 0.0157 - 0.0000i 0.0823 - 0.0000i 0.0614 - 0.0000i 0.0059 - 0.0000i 0.0030 - 0.0000i 0.0228 - 0.0000i 0.0523 - 0.0000i 0.1641 - 0.0000i]
AP23 = [0.4007 - 0.0000i 0.2231 - 0.0000i 0.0150 - 0.0000i 0.1109 - 0.0000i 0.0551 - 0.0000i 0.0054 - 0.0000i 0.0032 - 0.0000i 0.0235 - 0.0000i 0.0532 - 0.0000i 0.1672 - 0.0000i]
AP24 = [0.3884 - 0.0000i 0.2057 - 0.0000i 0.0143 - 0.0000i 0.1548 - 0.0000i 0.0494 - 0.0000i 0.0048 - 0.0000i 0.0033 - 0.0000i 0.0241 - 0.0000i 0.0542 - 0.0000i 0.1705 - 0.0000i]
AP25 = [0.3761 - 0.0000i 0.1905 - 0.0000i 0.0135 - 0.0000i 0.2246 - 0.0000i 0.0443 - 0.0000i 0.0044 - 0.0000i 0.0035 - 0.0000i 0.0248 - 0.0000i 0.0552 - 0.0000i 0.1740 - 0.0000i]
AP26 = [0.3637 - 0.0000i 0.1772 - 0.0000i 0.0127 - 0.0000i 0.3387 - 0.0000i 0.0397 - 0.0000i 0.0039 - 0.0000i 0.0038 - 0.0000i 0.0256 - 0.0000i 0.0562 - 0.0000i 0.1778 - 0.0000i]
AP27 = [0.3514 - 0.0000i 0.1655 - 0.0000i 0.0119 - 0.0000i 0.5199 - 0.0000i 0.0356 - 0.0000i 0.0035 - 0.0000i 0.0040 - 0.0000i 0.0264 - 0.0000i 0.0573 - 0.0000i 0.1818 - 0.0000i]
AP28 = [0.3391 - 0.0000i 0.1551 - 0.0000i 0.0111 - 0.0000i 0.7529 - 0.0000i 0.0320 - 0.0000i 0.0031 - 0.0000i 0.0043 - 0.0000i 0.0272 - 0.0000i 0.0584 - 0.0000i 0.1861 - 0.0000i]
AP29 = [0.3269 - 0.0000i 0.1458 - 0.0000i 0.0102 - 0.0000i 0.8838 - 0.0000i 0.0287 - 0.0000i 0.0027 - 0.0000i 0.0046 - 0.0000i 0.0280 - 0.0000i 0.0595 - 0.0000i 0.1907 - 0.0000i]
AP30 = [0.3146 - 0.0000i 0.1375 - 0.0000i 0.0093 - 0.0000i 0.7691 - 0.0000i 0.0258 - 0.0000i 0.0024 - 0.0000i 0.0049 - 0.0000i 0.0289 - 0.0000i 0.0607 - 0.0000i 0.1957 - 0.0000i]
AP31 = [0.3024 - 0.0000i 0.1300 - 0.0000i 0.0085 - 0.0000i 0.5544 - 0.0000i 0.0232 - 0.0000i 0.0021 - 0.0000i 0.0052 - 0.0000i 0.0297 - 0.0000i 0.0620 - 0.0000i 0.2010 - 0.0000i]
AP32 = [0.2902 - 0.0000i 0.1233 - 0.0000i 0.0076 - 0.0000i 0.3826 - 0.0000i 0.0208 - 0.0000i 0.0018 - 0.0000i 0.0055 - 0.0000i 0.0307 - 0.0000i 0.0633 - 0.0000i 0.2066 - 0.0000i]
AP33 = [0.2779 - 0.0000i 0.1171 - 0.0000i 0.0068 - 0.0000i 0.2698 - 0.0000i 0.0187 - 0.0000i 0.0016 - 0.0000i 0.0059 - 0.0000i 0.0316 - 0.0000i 0.0646 - 0.0000i 0.2127 - 0.0000i]
AP34 = [0.2656 - 0.0000i 0.1114 - 0.0000i 0.0061 - 0.0000i 0.1977 - 0.0000i 0.0168 - 0.0000i 0.0014 - 0.0000i 0.0063 - 0.0000i 0.0326 - 0.0000i 0.0660 - 0.0000i 0.2193 - 0.0000i]
AP35 = [0.2532 - 0.0000i 0.1062 - 0.0000i 0.0056 - 0.0000i 0.1504 - 0.0000i 0.0151 - 0.0000i 0.0012 - 0.0000i 0.0067 - 0.0000i 0.0336 - 0.0000i 0.0674 - 0.0000i 0.2263 - 0.0000i]
AP36 = [0.2406 - 0.0000i 0.1014 - 0.0000i 0.0054 - 0.0000i 0.1181 - 0.0000i 0.0136 - 0.0000i 0.0011 - 0.0000i 0.0071 - 0.0000i 0.0347 - 0.0000i 0.0689 - 0.0000i 0.2340 - 0.0000i]
AP37 = [0.2279 - 0.0000i 0.0969 - 0.0000i 0.0060 - 0.0000i 0.0953 - 0.0000i 0.0122 - 0.0000i 0.0009 - 0.0000i 0.0075 - 0.0000i 0.0357 - 0.0000i 0.0704 - 0.0000i 0.2423 - 0.0000i]
AP38 = [0.2148 - 0.0000i 0.0928 - 0.0000i 0.0078 - 0.0000i 0.0787 - 0.0000i 0.0109 - 0.0000i 0.0009 - 0.0000i 0.0080 - 0.0000i 0.0368 - 0.0000i 0.0720 - 0.0000i 0.2513 - 0.0000i]
AP39 = [0.2015 - 0.0000i 0.0888 - 0.0000i 0.0122 - 0.0000i 0.0662 - 0.0000i 0.0098 - 0.0000i 0.0008 - 0.0000i 0.0085 - 0.0000i 0.0380 - 0.0000i 0.0736 - 0.0000i 0.2611 - 0.0000i]
AP40 = [0.1876 - 0.0000i 0.0851 - 0.0000i 0.0224 - 0.0000i 0.0565 - 0.0000i 0.0088 - 0.0000i 0.0008 - 0.0000i 0.0090 - 0.0000i 0.0391 - 0.0000i 0.0753 - 0.0000i 0.2718 - 0.0000i]
AP41 = [0.1732 - 0.0000i 0.0815 - 0.0000i 0.0462 - 0.0000i 0.0489 - 0.0000i 0.0079 - 0.0000i 0.0007 - 0.0000i 0.0095 - 0.0000i 0.0403 - 0.0000i 0.0771 - 0.0000i 0.2836 - 0.0000i]
AP42 = [0.1581 - 0.0000i 0.0781 - 0.0000i 0.1076 - 0.0000i 0.0428 - 0.0000i 0.0070 - 0.0000i 0.0007 - 0.0000i 0.0100 - 0.0000i 0.0415 - 0.0000i 0.0789 - 0.0000i 0.2966 - 0.0000i]
AP43 = [0.1421 - 0.0000i 0.0748 - 0.0000i 0.2862 - 0.0000i 0.0378 - 0.0000i 0.0063 - 0.0000i 0.0008 - 0.0000i 0.0105 - 0.0000i 0.0427 - 0.0000i 0.0807 - 0.0000i 0.3110 - 0.0000i]
AP44 = [0.1251 - 0.0000i 0.0716 - 0.0000i 0.7167 - 0.0000i 0.0336 - 0.0000i 0.0056 - 0.0000i 0.0008 - 0.0000i 0.0111 - 0.0000i 0.0440 - 0.0000i 0.0826 - 0.0000i 0.3269 - 0.0000i]
AP45 = [0.1069 - 0.0000i 0.0685 - 0.0000i 0.7604 - 0.0000i 0.0302 - 0.0000i 0.0050 - 0.0000i 0.0009 - 0.0000i 0.0116 - 0.0000i 0.0452 - 0.0000i 0.0846 - 0.0000i 0.3447 - 0.0000i]
AP46 = [0.0874 - 0.0000i 0.0653 - 0.0000i 0.4318 - 0.0000i 0.0272 - 0.0000i 0.0045 - 0.0000i 0.0010 - 0.0000i 0.0122 - 0.0000i 0.0465 - 0.0000i 0.0866 - 0.0000i 0.3646 - 0.0000i]

AP47 = [0.0668 - 0.0000i 0.0622 - 0.0000i 0.2577 - 0.0000i 0.0247 - 0.0000i 0.0040 - 0.0000i 0.0011 - 0.0000i 0.0128 - 0.0000i 0.0478 - 0.0000i 0.0887 - 0.0000i 0.3871 - 0.0000i]
AP48 = [0.0456 - 0.0000i 0.0591 - 0.0000i 0.1748 - 0.0000i 0.0226 - 0.0000i 0.0035 - 0.0000i 0.0012 - 0.0000i 0.0134 - 0.0000i 0.0491 - 0.0000i 0.0908 - 0.0000i 0.4124 - 0.0000i]
AP49 = [0.0259 - 0.0000i 0.0558 - 0.0000i 0.1301 - 0.0000i 0.0207 - 0.0000i 0.0031 - 0.0000i 0.0013 - 0.0000i 0.0140 - 0.0000i 0.0505 - 0.0000i 0.0931 - 0.0000i 0.4412 - 0.0000i]
AP50 = [0.0125 - 0.0000i 0.0524 - 0.0000i 0.1033 - 0.0000i 0.0190 - 0.0000i 0.0028 - 0.0000i 0.0015 - 0.0000i 0.0146 - 0.0000i 0.0518 - 0.0000i 0.0954 - 0.0000i 0.4740 - 0.0000i]
AP51 = [0.0177 - 0.0000i 0.0489 - 0.0000i 0.0858 - 0.0000i 0.0176 - 0.0000i 0.0024 - 0.0000i 0.0016 - 0.0000i 0.0152 - 0.0000i 0.0532 - 0.0000i 0.0977 - 0.0000i 0.5114 - 0.0000i]
AP52 = [0.0670 - 0.0000i 0.0451 - 0.0000i 0.0736 - 0.0000i 0.0163 - 0.0000i 0.0021 - 0.0000i 0.0018 - 0.0000i 0.0159 - 0.0000i 0.0546 - 0.0000i 0.1002 - 0.0000i 0.5539 - 0.0000i]
AP53 = [0.1983 - 0.0000i 0.0411 - 0.0000i 0.0646 - 0.0000i 0.0151 - 0.0000i 0.0019 - 0.0000i 0.0020 - 0.0000i 0.0165 - 0.0000i 0.0559 - 0.0000i 0.1027 - 0.0000i 0.6023 - 0.0000i]
AP54 = [0.4121 - 0.0000i 0.0368 - 0.0000i 0.0578 - 0.0000i 0.0141 - 0.0000i 0.0016 - 0.0000i 0.0022 - 0.0000i 0.0172 - 0.0000i 0.0573 - 0.0000i 0.1053 - 0.0000i 0.6567 - 0.0000i]
AP55 = [0.6054 - 0.0000i 0.0324 - 0.0000i 0.0525 - 0.0000i 0.0131 - 0.0000i 0.0014 - 0.0000i 0.0024 - 0.0000i 0.0178 - 0.0000i 0.0587 - 0.0000i 0.1080 - 0.0000i 0.7167 - 0.0000i]
AP56 = [0.6844 - 0.0000i 0.0292 - 0.0000i 0.0482 - 0.0000i 0.0123 - 0.0000i 0.0012 - 0.0000i 0.0026 - 0.0000i 0.0184 - 0.0000i 0.0601 - 0.0000i 0.1107 - 0.0000i 0.7807 - 0.0000i]
AP57 = [0.6745 - 0.0000i 0.0316 - 0.0000i 0.0447 - 0.0000i 0.0115 - 0.0000i 0.0011 - 0.0000i 0.0028 - 0.0000i 0.0191 - 0.0000i 0.0615 - 0.0000i 0.1136 - 0.0000i 0.8451 - 0.0000i]
AP58 = [0.6304 - 0.0000i 0.0640 - 0.0000i 0.0417 - 0.0000i 0.0108 - 0.0000i 0.0009 - 0.0000i 0.0030 - 0.0000i 0.0197 - 0.0000i 0.0629 - 0.0000i 0.1166 - 0.0000i 0.9036 - 0.0000i]
AP59 = [0.5813 - 0.0000i 0.3004 - 0.0000i 0.0392 - 0.0000i 0.0102 - 0.0000i 0.0008 - 0.0000i 0.0032 - 0.0000i 0.0204 - 0.0000i 0.0643 - 0.0000i 0.1196 - 0.0000i 0.9464 - 0.0000i]
AP60 = [0.5367 - 0.0000i 0.8694 - 0.0000i 0.0371 - 0.0000i 0.0096 - 0.0000i 0.0007 - 0.0000i 0.0035 - 0.0000i 0.0210 - 0.0000i 0.0657 - 0.0000i 0.1228 - 0.0000i 0.9627 - 0.0000i]
AP61 = [0.4987 - 0.0000i 0.4383 - 0.0000i 0.0352 - 0.0000i 0.0091 - 0.0000i 0.0006 - 0.0000i 0.0037 - 0.0000i 0.0216 - 0.0000i 0.0671 - 0.0000i 0.1261 - 0.0000i 0.9437 - 0.0000i]
AP62 = [0.4668 - 0.0000i 0.2555 - 0.0000i 0.0336 - 0.0000i 0.0086 - 0.0000i 0.0005 - 0.0000i 0.0039 - 0.0000i 0.0223 - 0.0000i 0.0684 - 0.0000i 0.1295 - 0.0000i 0.8880 - 0.0000i]
AP63 = [0.4400 - 0.0000i 0.1847 - 0.0000i 0.0321 - 0.0000i 0.0082 - 0.0000i 0.0004 - 0.0000i 0.0042 - 0.0000i 0.0229 - 0.0000i 0.0698 - 0.0000i 0.1330 - 0.0000i 0.8031 - 0.0000i]
AP64 = [0.4174 - 0.0000i 0.1495 - 0.0000i 0.0309 - 0.0000i 0.0078 - 0.0000i 0.0004 - 0.0000i 0.0044 - 0.0000i 0.0235 - 0.0000i 0.0711 - 0.0000i 0.1367 - 0.0000i 0.7026 - 0.0000i]
AP65 = [0.3982 - 0.0000i 0.1288 - 0.0000i 0.0297 - 0.0000i 0.0074 - 0.0000i 0.0003 - 0.0000i 0.0046 - 0.0000i 0.0241 - 0.0000i 0.0725 - 0.0000i 0.1405 - 0.0000i 0.6004 - 0.0000i]
AP66 = [0.3817 - 0.0000i 0.1153 - 0.0000i 0.0287 - 0.0000i 0.0070 - 0.0000i 0.0003 - 0.0000i 0.0049 - 0.0000i 0.0247 - 0.0000i 0.0738 - 0.0000i 0.1444 - 0.0000i 0.5064 - 0.0000i]
AP67 = [0.3673 - 0.0000i 0.1058 - 0.0000i 0.0277 - 0.0000i 0.0067 - 0.0000i 0.0002 - 0.0000i 0.0051 - 0.0000i 0.0253 - 0.0000i 0.0750 - 0.0000i 0.1485 - 0.0000i 0.4252 - 0.0000i]
AP68 = [0.3548 - 0.0000i 0.0988 - 0.0000i 0.0269 - 0.0000i 0.0064 - 0.0000i 0.0002 - 0.0000i 0.0053 - 0.0000i 0.0258 - 0.0000i 0.0763 - 0.0000i 0.1527 - 0.0000i 0.3581 - 0.0000i]
AP69 = [0.3439 - 0.0000i 0.0933 - 0.0000i 0.0261 - 0.0000i 0.0062 - 0.0000i 0.0002 - 0.0000i 0.0055 - 0.0000i 0.0264 - 0.0000i 0.0775 - 0.0000i 0.1570 - 0.0000i 0.3040 - 0.0000i]
AP70 = [0.3342 - 0.0000i 0.0889 - 0.0000i 0.0254 - 0.0000i 0.0059 - 0.0000i 0.0002 - 0.0000i 0.0058 - 0.0000i 0.0269 - 0.0000i 0.0787 - 0.0000i 0.1615 - 0.0000i 0.2610 - 0.0000i]
AP71 = [0.3256 - 0.0000i 0.0854 - 0.0000i 0.0248 - 0.0000i 0.0057 - 0.0000i 0.0002 - 0.0000i 0.0060 - 0.0000i 0.0274 - 0.0000i 0.0799 - 0.0000i 0.1660 - 0.0000i 0.2270 - 0.0000i]

AP72 = [0.3179 - 0.0000i   0.0824 - 0.0000i   0.0242 - 0.0000i   0.0055 - 0.0000i   0.0002 - 0.0000i   0.0062 - 0.0000i   0.0279 - 0.0000i   0.0810 - 0.0000i 0.1707 - 0.0000i   0.2003 - 0.0000i]
AP73 = [0.3110 - 0.0000i   0.0799 - 0.0000i   0.0237 - 0.0000i   0.0053 - 0.0000i   0.0002 - 0.0000i   0.0064 - 0.0000i   0.0284 - 0.0000i   0.0821 - 0.0000i 0.1756 - 0.0000i   0.1793 - 0.0000i]
AP74 = [0.3049 - 0.0000i   0.0778 - 0.0000i   0.0232 - 0.0000i   0.0051 - 0.0000i   0.0002 - 0.0000i   0.0066 - 0.0000i   0.0289 - 0.0000i   0.0831 - 0.0000i 0.1805 - 0.0000i   0.1627 - 0.0000i]
AP75 = [0.6666 - 0.0000i   0.8262 - 0.0000i   0.7500 - 0.0000i   0.6021 - 0.0000i   0.4568 - 0.0000i   0.4869 - 0.0000i   0.5255 - 0.0000i   0.5920 - 0.0000i 0.7278 - 0.0000i   0.7393 - 0.0000i]
AP76 = [0.2945 - 0.0000i   0.0743 - 0.0000i   0.0224 - 0.0000i   0.0048 - 0.0000i   0.0002 - 0.0000i   0.0069 - 0.0000i   0.0297 - 0.0000i   0.0851 - 0.0000i 0.1904 - 0.0000i   0.1393 - 0.0000i]
AP77 = [0.2901 - 0.0000i   0.0729 - 0.0000i   0.0220 - 0.0000i   0.0046 - 0.0000i   0.0002 - 0.0000i   0.0071 - 0.0000i   0.0301 - 0.0000i   0.0860 - 0.0000i 0.1954 - 0.0000i   0.1311 - 0.0000i]
AP78 = [0.2861 - 0.0000i   0.0717 - 0.0000i   0.0217 - 0.0000i   0.0045 - 0.0000i   0.0002 - 0.0000i   0.0072 - 0.0000i   0.0305 - 0.0000i   0.0868 - 0.0000i 0.2004 - 0.0000i   0.1246 - 0.0000i]
AP79 = [0.2826 - 0.0000i   0.0706 - 0.0000i   0.0214 - 0.0000i   0.0044 - 0.0000i   0.0002 - 0.0000i   0.0074 - 0.0000i   0.0308 - 0.0000i   0.0876 - 0.0000i 0.2053 - 0.0000i   0.1194 - 0.0000i]
AP80 = [0.2795 - 0.0000i   0.0697 - 0.0000i   0.0211 - 0.0000i   0.0043 - 0.0000i   0.0002 - 0.0000i   0.0075 - 0.0000i   0.0311 - 0.0000i   0.0883 - 0.0000i 0.2101 - 0.0000i   0.1153 - 0.0000i]
AP81 = [0.2767 - 0.0000i   0.0689 - 0.0000i   0.0209 - 0.0000i   0.0042 - 0.0000i   0.0002 - 0.0000i   0.0076 - 0.0000i   0.0314 - 0.0000i   0.0890 - 0.0000i 0.2146 - 0.0000i   0.1121 - 0.0000i]
AP82 = [0.2743 - 0.0000i   0.0682 - 0.0000i   0.0207 - 0.0000i   0.0041 - 0.0000i   0.0002 - 0.0000i   0.0077 - 0.0000i   0.0317 - 0.0000i   0.0896 - 0.0000i 0.2190 - 0.0000i   0.1095 - 0.0000i]
AP83 = [0.2722 - 0.0000i   0.0676 - 0.0000i   0.0205 - 0.0000i   0.0041 - 0.0000i   0.0002 - 0.0000i   0.0078 - 0.0000i   0.0319 - 0.0000i   0.0901 - 0.0000i 0.2230 - 0.0000i   0.1074 - 0.0000i]
AP84 = [0.2704 - 0.0000i   0.0671 - 0.0000i   0.0204 - 0.0000i   0.0040 - 0.0000i   0.0002 - 0.0000i   0.0079 - 0.0000i   0.0321 - 0.0000i   0.0906 - 0.0000i 0.2266 - 0.0000i   0.1058 - 0.0000i]
AP85 = [0.2690 - 0.0000i   0.0667 - 0.0000i   0.0202 - 0.0000i   0.0040 - 0.0000i   0.0002 - 0.0000i   0.0080 - 0.0000i   0.0323 - 0.0000i   0.0910 - 0.0000i 0.2298 - 0.0000i   0.1046 - 0.0000i]
AP86 = [0.2678 - 0.0000i   0.0663 - 0.0000i   0.0201 - 0.0000i   0.0039 - 0.0000i   0.0003 - 0.0000i   0.0081 - 0.0000i   0.0324 - 0.0000i   0.0913 - 0.0000i 0.2326 - 0.0000i   0.1036 - 0.0000i]
AP87 = [0.2668 - 0.0000i   0.0661 - 0.0000i   0.0201 - 0.0000i   0.0039 - 0.0000i   0.0003 - 0.0000i   0.0081 - 0.0000i   0.0325 - 0.0000i   0.0916 - 0.0000i 0.2347 - 0.0000i   0.1029 - 0.0000i]
AP88 = [0.2662 - 0.0000i   0.0659 - 0.0000i   0.0200 - 0.0000i   0.0039 - 0.0000i   0.0003 - 0.0000i   0.0081 - 0.0000i   0.0326 - 0.0000i   0.0917 - 0.0000i 0.2363 - 0.0000i   0.1025 - 0.0000i]
AP89 = [0.2658 - 0.0000i   0.0658 - 0.0000i   0.0200 - 0.0000i   0.0039 - 0.0000i   0.0003 - 0.0000i   0.0082 - 0.0000i   0.0326 - 0.0000i   0.0919 - 0.0000i 0.2373 - 0.0000i   0.1022 - 0.0000i]

p-polarization values

RP1 = [0.4234   0.2774   0.9761   0.9931   0.6814   0.9834   0.9980   0.9839   0.9571   0.8655]
RP2 = [0.4246   0.2667   0.9761   0.9930   0.6859   0.9835   0.9980   0.9838   0.9570   0.8652]
RP3 = [0.4266   0.2499   0.9762   0.9928   0.6932   0.9837   0.9980   0.9837   0.9568   0.8647]
RP4 = [0.4295   0.2291   0.9764   0.9926   0.7031   0.9839   0.9980   0.9836   0.9566   0.8639]
RP5 = [0.4331   0.2070   0.9765   0.9922   0.7151   0.9842   0.9980   0.9835   0.9564   0.8630]
RP6 = [0.4375   0.1878   0.9768   0.9917   0.7289   0.9845   0.9980   0.9833   0.9560   0.8618]
RP7 = [0.4428   0.1762   0.9770   0.9911   0.7440   0.9849   0.9980   0.9831   0.9556   0.8603]
RP8 = [0.4488   0.1767   0.9773   0.9904   0.7599   0.9853   0.9980   0.9828   0.9552   0.8587]
RP9 = [0.4557   0.1925   0.9776   0.9895   0.7763   0.9858   0.9979   0.9826   0.9546   0.8567]
RP10 = [0.4634   0.2238   0.9780   0.9883   0.7928   0.9863   0.9979   0.9822   0.9540   0.8545]

RP11 = [0.4718 0.2684 0.9784 0.9869 0.8090 0.9868 0.9979 0.9819 0.9533 0.8519]
RP12 = [0.4811 0.3221 0.9789 0.9852 0.8246 0.9873 0.9978 0.9815 0.9525 0.8491]
RP13 = [0.4911 0.3799 0.9794 0.9830 0.8395 0.9879 0.9978 0.9810 0.9517 0.8459]
RP14 = [0.5018 0.4377 0.9799 0.9802 0.8535 0.9885 0.9977 0.9805 0.9507 0.8422]
RP15 = [0.5132 0.4925 0.9804 0.9768 0.8665 0.9890 0.9976 0.9800 0.9497 0.8382]
RP16 = [0.5254 0.5427 0.9810 0.9723 0.8786 0.9896 0.9976 0.9794 0.9485 0.8337]
RP17 = [0.5381 0.5876 0.9817 0.9666 0.8897 0.9902 0.9975 0.9788 0.9473 0.8287]
RP18 = [0.5515 0.6272 0.9823 0.9591 0.8998 0.9908 0.9973 0.9781 0.9459 0.8231]
RP19 = [0.5655 0.6619 0.9830 0.9491 0.9089 0.9914 0.9972 0.9773 0.9444 0.8168]
RP20 = [0.5800 0.6920 0.9838 0.9356 0.9172 0.9919 0.9971 0.9765 0.9427 0.8097]
RP21 = [0.5950 0.7183 0.9846 0.9170 0.9248 0.9925 0.9969 0.9755 0.9409 0.8019]
RP22 = [0.6105 0.7412 0.9854 0.8906 0.9315 0.9930 0.9967 0.9746 0.9389 0.7930]
RP23 = [0.6264 0.7612 0.9862 0.8523 0.9377 0.9935 0.9965 0.9735 0.9366 0.7830]
RP24 = [0.6428 0.7789 0.9870 0.7956 0.9432 0.9940 0.9962 0.9723 0.9342 0.7717]
RP25 = [0.6596 0.7945 0.9879 0.7102 0.9481 0.9945 0.9959 0.9710 0.9315 0.7589]
RP26 = [0.6768 0.8084 0.9888 0.5827 0.9526 0.9949 0.9956 0.9696 0.9285 0.7443]
RP27 = [0.6943 0.8208 0.9897 0.4067 0.9567 0.9954 0.9953 0.9681 0.9252 0.7276]
RP28 = [0.7121 0.8320 0.9906 0.2166 0.9604 0.9958 0.9949 0.9664 0.9216 0.7084]
RP29 = [0.7303 0.8422 0.9915 0.1162 0.9637 0.9961 0.9945 0.9645 0.9175 0.6862]
RP30 = [0.7487 0.8515 0.9923 0.1783 0.9667 0.9965 0.9940 0.9625 0.9129 0.6604]
RP31 = [0.7674 0.8600 0.9930 0.3348 0.9695 0.9968 0.9935 0.9602 0.9077 0.6304]
RP32 = [0.7864 0.8679 0.9937 0.4911 0.9720 0.9971 0.9929 0.9577 0.9018 0.5952]
RP33 = [0.8055 0.8752 0.9941 0.6123 0.9743 0.9973 0.9922 0.9550 0.8952 0.5538]
RP34 = [0.8248 0.8821 0.9942 0.6995 0.9764 0.9976 0.9914 0.9519 0.8876 0.5052]
RP35 = [0.8442 0.8886 0.9939 0.7615 0.9783 0.9978 0.9906 0.9484 0.8788 0.4482]
RP36 = [0.8636 0.8948 0.9930 0.8064 0.9801 0.9979 0.9897 0.9445 0.8687 0.3820]
RP37 = [0.8829 0.9007 0.9910 0.8395 0.9817 0.9981 0.9886 0.9401 0.8568 0.3067]
RP38 = [0.9019 0.9063 0.9875 0.8645 0.9833 0.9981 0.9874 0.9350 0.8429 0.2242]
RP39 = [0.9205 0.9117 0.9815 0.8839 0.9847 0.9982 0.9861 0.9292 0.8263 0.1400]
RP40 = [0.9382 0.9170 0.9714 0.8992 0.9860 0.9982 0.9846 0.9226 0.8065 0.0648]
RP41 = [0.9546 0.9222 0.9546 0.9115 0.9872 0.9981 0.9829 0.9148 0.7824 0.0144]
RP42 = [0.9692 0.9272 0.9262 0.9216 0.9883 0.9980 0.9809 0.9057 0.7528 0.0057]
RP43 = [0.9809 0.9322 0.8770 0.9299 0.9894 0.9978 0.9786 0.8950 0.7163 0.0483]
RP44 = [0.9885 0.9371 0.7907 0.9370 0.9904 0.9976 0.9759 0.8822 0.6705 0.1368]
RP45 = [0.9902 0.9419 0.6420 0.9431 0.9913 0.9972 0.9729 0.8668 0.6128 0.2533]
RP46 = [0.9836 0.9467 0.4184 0.9483 0.9922 0.9967 0.9692 0.8480 0.5400 0.3766]
RP47 = [0.9651 0.9514 0.2018 0.9529 0.9930 0.9961 0.9649 0.8248 0.4488 0.4914]
RP48 = [0.9307 0.9562 0.1624 0.9570 0.9937 0.9954 0.9598 0.7958 0.3386 0.5900]
RP49 = [0.8756 0.9608 0.2907 0.9606 0.9944 0.9945 0.9536 0.7591 0.2153 0.6708]
RP50 = [0.7961 0.9655 0.4483 0.9639 0.9951 0.9933 0.9461 0.7120 0.0998 0.7354]
RP51 = [0.6924 0.9700 0.5731 0.9668 0.9956 0.9919 0.9368 0.6511 0.0301 0.7863]
RP52 = [0.5724 0.9744 0.6622 0.9696 0.9961 0.9901 0.9251 0.5721 0.0438 0.8264]
RP53 = [0.4545 0.9785 0.7251 0.9721 0.9965 0.9878 0.9103 0.4705 0.1432 0.8579]
RP54 = [0.3620 0.9823 0.7706 0.9745 0.9969 0.9850 0.8912 0.3451 0.2897 0.8828]
RP55 = [0.3130 0.9856 0.8045 0.9767 0.9971 0.9814 0.8660 0.2043 0.4390 0.9025]
RP56 = [0.3108 0.9882 0.8303 0.9787 0.9971 0.9767 0.8323 0.0770 0.5663 0.9182]
RP57 = [0.3463 0.9897 0.8507 0.9807 0.9970 0.9707 0.7863 0.0125 0.6661 0.9309]
RP58 = [0.4050 0.9896 0.8670 0.9826 0.9966 0.9629 0.7223 0.0478 0.7413 0.9411]
RP59 = [0.4744 0.9873 0.8805 0.9844 0.9959 0.9523 0.6327 0.1679 0.7975 0.9494]
RP60 = [0.5459 0.9816 0.8918 0.9861 0.9947 0.9381 0.5086 0.3211 0.8395 0.9562]
RP61 = [0.6146 0.9713 0.9015 0.9877 0.9930 0.9182 0.3471 0.4650 0.8712 0.9617]

RP62 = [0.6779 0.9544 0.9099 0.9892 0.9904 0.8901 0.1699 0.5826 0.8954 0.9663]
RP63 = [0.7348 0.9282 0.9174 0.9906 0.9867 0.8492 0.0450 0.6729 0.9140 0.9701]
RP64 = [0.7852 0.8896 0.9240 0.9918 0.9813 0.7885 0.0489 0.7408 0.9286 0.9732]
RP65 = [0.8292 0.8348 0.9301 0.9928 0.9735 0.6970 0.1734 0.7917 0.9400 0.9758]
RP66 = [0.8672 0.7611 0.9356 0.9936 0.9621 0.5608 0.3394 0.8302 0.9492 0.9780]
RP67 = [0.8994 0.6680 0.9408 0.9939 0.9451 0.3736 0.4885 0.8596 0.9566 0.9799]
RP68 = [0.9262 0.5606 0.9456 0.9937 0.9194 0.1708 0.6038 0.8823 0.9626 0.9814]
RP69 = [0.9481 0.4505 0.9501 0.9926 0.8796 0.0564 0.6885 0.9002 0.9675 0.9827]
RP70 = [0.9655 0.3535 0.9544 0.9903 0.8172 0.1055 0.7503 0.9144 0.9716 0.9838]
RP71 = [0.9786 0.2830 0.9584 0.9861 0.7189 0.2566 0.7957 0.9257 0.9750 0.9847]
RP72 = [0.9878 0.2444 0.9622 0.9792 0.5692 0.4155 0.8296 0.9350 0.9778 0.9854]
RP73 = [0.9937 0.2345 0.9658 0.9682 0.3674 0.5429 0.8553 0.9425 0.9801 0.9861]
RP74 = [0.9965 0.2453 0.9691 0.9508 0.1694 0.6364 0.8752 0.9487 0.9821 0.9866]
RP75 = [0.4739 0.5166 0.6341 0.3245 0.6346 0.5856 0.6010 0.5934 0.4087 0.5306]
RP76 = [0.9946 0.2978 0.9747 0.8820 0.1432 0.7531 0.9032 0.9582 0.9852 0.9874]
RP77 = [0.9908 0.3287 0.9768 0.8186 0.2729 0.7894 0.9131 0.9619 0.9864 0.9878]
RP78 = [0.9856 0.3587 0.9783 0.7255 0.4019 0.8167 0.9212 0.9649 0.9875 0.9880]
RP79 = [0.9794 0.3864 0.9790 0.5977 0.5058 0.8377 0.9278 0.9675 0.9883 0.9882]
RP80 = [0.9726 0.4113 0.9789 0.4424 0.5839 0.8540 0.9332 0.9697 0.9891 0.9884]
RP81 = [0.9654 0.4333 0.9777 0.2881 0.6417 0.8667 0.9377 0.9715 0.9897 0.9886]
RP82 = [0.9583 0.4523 0.9753 0.1746 0.6846 0.8768 0.9414 0.9731 0.9902 0.9887]
RP83 = [0.9513 0.4686 0.9719 0.1242 0.7166 0.8849 0.9444 0.9744 0.9907 0.9888]
RP84 = [0.9449 0.4822 0.9674 0.1272 0.7407 0.8912 0.9468 0.9754 0.9910 0.9889]
RP85 = [0.9391 0.4935 0.9621 0.1594 0.7588 0.8962 0.9488 0.9763 0.9913 0.9889]
RP86 = [0.9342 0.5024 0.9566 0.1999 0.7722 0.9000 0.9504 0.9770 0.9916 0.9890]
RP87 = [0.9303 0.5093 0.9513 0.2370 0.7818 0.9029 0.9515 0.9775 0.9918 0.9890]
RP88 = [0.9274 0.5141 0.9469 0.2651 0.7883 0.9048 0.9523 0.9779 0.9919 0.9890]
RP89 = [0.9256 0.5169 0.9440 0.2823 0.7921 0.9060 0.9528 0.9781 0.9920 0.9891]

AP1 = [0.5766 - 0.0000i 0.7226 - 0.0000i 0.0239 - 0.0000i 0.0069 - 0.0000i 0.3186 - 0.0000i 0.0166 - 0.0000i 0.0020 - 0.0000i 0.0161 - 0.0000i 0.0429 - 0.0000i 0.1345 - 0.0000i]
AP2 = [0.5754 - 0.0000i 0.7333 - 0.0000i 0.0239 - 0.0000i 0.0070 - 0.0000i 0.3141 - 0.0000i 0.0165 - 0.0000i 0.0020 - 0.0000i 0.0162 - 0.0000i 0.0430 - 0.0000i 0.1348 - 0.0000i]
AP3 = [0.5734 - 0.0000i 0.7501 - 0.0000i 0.0238 - 0.0000i 0.0072 - 0.0000i 0.3068 - 0.0000i 0.0163 - 0.0000i 0.0020 - 0.0000i 0.0163 - 0.0000i 0.0432 - 0.0000i 0.1353 - 0.0000i]
AP4 = [0.5705 - 0.0000i 0.7709 - 0.0000i 0.0236 - 0.0000i 0.0074 - 0.0000i 0.2969 - 0.0000i 0.0161 - 0.0000i 0.0020 - 0.0000i 0.0164 - 0.0000i 0.0434 - 0.0000i 0.1361 - 0.0000i]
AP5 = [0.5669 - 0.0000i 0.7930 - 0.0000i 0.0235 - 0.0000i 0.0078 - 0.0000i 0.2849 - 0.0000i 0.0158 - 0.0000i 0.0020 - 0.0000i 0.0165 - 0.0000i 0.0436 - 0.0000i 0.1370 - 0.0000i]
AP6 = [0.5625 - 0.0000i 0.8122 - 0.0000i 0.0232 - 0.0000i 0.0083 - 0.0000i 0.2711 - 0.0000i 0.0155 - 0.0000i 0.0020 - 0.0000i 0.0167 - 0.0000i 0.0440 - 0.0000i 0.1382 - 0.0000i]
AP7 = [0.5572 - 0.0000i 0.8238 - 0.0000i 0.0230 - 0.0000i 0.0089 - 0.0000i 0.2560 - 0.0000i 0.0151 - 0.0000i 0.0020 - 0.0000i 0.0169 - 0.0000i 0.0444 - 0.0000i 0.1397 - 0.0000i]
AP8 = [0.5512 - 0.0000i 0.8233 - 0.0000i 0.0227 - 0.0000i 0.0096 - 0.0000i 0.2401 - 0.0000i 0.0147 - 0.0000i 0.0020 - 0.0000i 0.0172 - 0.0000i 0.0448 - 0.0000i 0.1413 - 0.0000i]
AP9 = [0.5443 - 0.0000i 0.8075 - 0.0000i 0.0224 - 0.0000i 0.0105 - 0.0000i 0.2237 - 0.0000i 0.0142 - 0.0000i 0.0021 - 0.0000i 0.0174 - 0.0000i 0.0454 - 0.0000i 0.1433 - 0.0000i]
AP10 = [0.5366 - 0.0000i 0.7762 - 0.0000i 0.0220 - 0.0000i 0.0117 - 0.0000i 0.2072 - 0.0000i 0.0137 - 0.0000i 0.0021 - 0.0000i 0.0178 - 0.0000i 0.0460 - 0.0000i 0.1455 - 0.0000i]

AP11 = [0.5282 - 0.0000i 0.7316 - 0.0000i 0.0216 - 0.0000i 0.0131 - 0.0000i 0.1910 - 0.0000i 0.0132 - 0.0000i 0.0021 - 0.0000i 0.0181 - 0.0000i 0.0467 - 0.0000i 0.1481 - 0.0000i]
AP12 = [0.5189 - 0.0000i 0.6779 - 0.0000i 0.0211 - 0.0000i 0.0148 - 0.0000i 0.1754 - 0.0000i 0.0127 - 0.0000i 0.0022 - 0.0000i 0.0185 - 0.0000i 0.0475 - 0.0000i 0.1509 - 0.0000i]
AP13 = [0.5089 - 0.0000i 0.6201 - 0.0000i 0.0206 - 0.0000i 0.0170 - 0.0000i 0.1605 - 0.0000i 0.0121 - 0.0000i 0.0022 - 0.0000i 0.0190 - 0.0000i 0.0483 - 0.0000i 0.1541 - 0.0000i]
AP14 = [0.4982 - 0.0000i 0.5623 - 0.0000i 0.0201 - 0.0000i 0.0198 - 0.0000i 0.1465 - 0.0000i 0.0115 - 0.0000i 0.0023 - 0.0000i 0.0195 - 0.0000i 0.0493 - 0.0000i 0.1578 - 0.0000i]
AP15 = [0.4868 - 0.0000i 0.5075 - 0.0000i 0.0196 - 0.0000i 0.0232 - 0.0000i 0.1335 - 0.0000i 0.0110 - 0.0000i 0.0024 - 0.0000i 0.0200 - 0.0000i 0.0503 - 0.0000i 0.1618 - 0.0000i]
AP16 = [0.4746 - 0.0000i 0.4573 - 0.0000i 0.0190 - 0.0000i 0.0277 - 0.0000i 0.1214 - 0.0000i 0.0104 - 0.0000i 0.0024 - 0.0000i 0.0206 - 0.0000i 0.0515 - 0.0000i 0.1663 - 0.0000i]
AP17 = [0.4619 - 0.0000i 0.4124 - 0.0000i 0.0183 - 0.0000i 0.0334 - 0.0000i 0.1103 - 0.0000i 0.0098 - 0.0000i 0.0025 - 0.0000i 0.0212 - 0.0000i 0.0527 - 0.0000i 0.1713 - 0.0000i]
AP18 = [0.4485 - 0.0000i 0.3728 - 0.0000i 0.0177 - 0.0000i 0.0409 - 0.0000i 0.1002 - 0.0000i 0.0092 - 0.0000i 0.0027 - 0.0000i 0.0219 - 0.0000i 0.0541 - 0.0000i 0.1769 - 0.0000i]
AP19 = [0.4345 - 0.0000i 0.3381 - 0.0000i 0.0170 - 0.0000i 0.0509 - 0.0000i 0.0911 - 0.0000i 0.0086 - 0.0000i 0.0028 - 0.0000i 0.0227 - 0.0000i 0.0556 - 0.0000i 0.1832 - 0.0000i]
AP20 = [0.4200 - 0.0000i 0.3080 - 0.0000i 0.0162 - 0.0000i 0.0644 - 0.0000i 0.0828 - 0.0000i 0.0081 - 0.0000i 0.0029 - 0.0000i 0.0235 - 0.0000i 0.0573 - 0.0000i 0.1903 - 0.0000i]
AP21 = [0.4050 - 0.0000i 0.2817 - 0.0000i 0.0154 - 0.0000i 0.0830 - 0.0000i 0.0752 - 0.0000i 0.0075 - 0.0000i 0.0031 - 0.0000i 0.0245 - 0.0000i 0.0591 - 0.0000i 0.1981 - 0.0000i]
AP22 = [0.3895 - 0.0000i 0.2588 - 0.0000i 0.0146 - 0.0000i 0.1094 - 0.0000i 0.0685 - 0.0000i 0.0070 - 0.0000i 0.0033 - 0.0000i 0.0254 - 0.0000i 0.0611 - 0.0000i 0.2070 - 0.0000i]
AP23 = [0.3736 - 0.0000i 0.2388 - 0.0000i 0.0138 - 0.0000i 0.1477 - 0.0000i 0.0623 - 0.0000i 0.0065 - 0.0000i 0.0035 - 0.0000i 0.0265 - 0.0000i 0.0634 - 0.0000i 0.2170 - 0.0000i]
AP24 = [0.3572 - 0.0000i 0.2211 - 0.0000i 0.0130 - 0.0000i 0.2044 - 0.0000i 0.0568 - 0.0000i 0.0060 - 0.0000i 0.0038 - 0.0000i 0.0277 - 0.0000i 0.0658 - 0.0000i 0.2283 - 0.0000i]
AP25 = [0.3404 - 0.0000i 0.2055 - 0.0000i 0.0121 - 0.0000i 0.2898 - 0.0000i 0.0519 - 0.0000i 0.0055 - 0.0000i 0.0041 - 0.0000i 0.0290 - 0.0000i 0.0685 - 0.0000i 0.2411 - 0.0000i]
AP26 = [0.3232 - 0.0000i 0.1916 - 0.0000i 0.0112 - 0.0000i 0.4173 - 0.0000i 0.0474 - 0.0000i 0.0051 - 0.0000i 0.0044 - 0.0000i 0.0304 - 0.0000i 0.0715 - 0.0000i 0.2557 - 0.0000i]
AP27 = [0.3057 - 0.0000i 0.1792 - 0.0000i 0.0103 - 0.0000i 0.5933 - 0.0000i 0.0433 - 0.0000i 0.0046 - 0.0000i 0.0047 - 0.0000i 0.0319 - 0.0000i 0.0748 - 0.0000i 0.2724 - 0.0000i]
AP28 = [0.2879 - 0.0000i 0.1680 - 0.0000i 0.0094 - 0.0000i 0.7834 - 0.0000i 0.0396 - 0.0000i 0.0042 - 0.0000i 0.0051 - 0.0000i 0.0336 - 0.0000i 0.0784 - 0.0000i 0.2916 - 0.0000i]
AP29 = [0.2697 - 0.0000i 0.1578 - 0.0000i 0.0085 - 0.0000i 0.8838 - 0.0000i 0.0363 - 0.0000i 0.0039 - 0.0000i 0.0055 - 0.0000i 0.0355 - 0.0000i 0.0825 - 0.0000i 0.3138 - 0.0000i]
AP30 = [0.2513 - 0.0000i 0.1485 - 0.0000i 0.0077 - 0.0000i 0.8217 - 0.0000i 0.0333 - 0.0000i 0.0035 - 0.0000i 0.0060 - 0.0000i 0.0375 - 0.0000i 0.0871 - 0.0000i 0.3396 - 0.0000i]
AP31 = [0.2326 - 0.0000i 0.1400 - 0.0000i 0.0070 - 0.0000i 0.6652 - 0.0000i 0.0305 - 0.0000i 0.0032 - 0.0000i 0.0065 - 0.0000i 0.0398 - 0.0000i 0.0923 - 0.0000i 0.3696 - 0.0000i]
AP32 = [0.2136 - 0.0000i 0.1321 - 0.0000i 0.0063 - 0.0000i 0.5089 - 0.0000i 0.0280 - 0.0000i 0.0029 - 0.0000i 0.0071 - 0.0000i 0.0423 - 0.0000i 0.0982 - 0.0000i 0.4048 - 0.0000i]
AP33 = [0.1945 - 0.0000i 0.1248 - 0.0000i 0.0059 - 0.0000i 0.3877 - 0.0000i 0.0257 - 0.0000i 0.0027 - 0.0000i 0.0078 - 0.0000i 0.0450 - 0.0000i 0.1048 - 0.0000i 0.4462 - 0.0000i]
AP34 = [0.1752 - 0.0000i 0.1179 - 0.0000i 0.0058 - 0.0000i 0.3005 - 0.0000i 0.0236 - 0.0000i 0.0024 - 0.0000i 0.0086 - 0.0000i 0.0481 - 0.0000i 0.1124 - 0.0000i 0.4948 - 0.0000i]
AP35 = [0.1558 - 0.0000i 0.1114 - 0.0000i 0.0061 - 0.0000i 0.2385 - 0.0000i 0.0217 - 0.0000i 0.0022 - 0.0000i 0.0094 - 0.0000i 0.0516 - 0.0000i 0.1212 - 0.0000i 0.5518 - 0.0000i]

AP36 = [0.1364 - 0.0000i 0.1052 - 0.0000i 0.0070 - 0.0000i 0.1936 - 0.0000i 0.0199 - 0.0000i 0.0021 - 0.0000i 0.0103 - 0.0000i 0.0555 - 0.0000i 0.1313 - 0.0000i 0.6180 - 0.0000i]
AP37 = [0.1171 - 0.0000i 0.0993 - 0.0000i 0.0090 - 0.0000i 0.1605 - 0.0000i 0.0183 - 0.0000i 0.0019 - 0.0000i 0.0114 - 0.0000i 0.0599 - 0.0000i 0.1432 - 0.0000i 0.6933 - 0.0000i]
AP38 = [0.0981 - 0.0000i 0.0937 - 0.0000i 0.0125 - 0.0000i 0.1355 - 0.0000i 0.0167 - 0.0000i 0.0019 - 0.0000i 0.0126 - 0.0000i 0.0650 - 0.0000i 0.1571 - 0.0000i 0.7758 - 0.0000i]
AP39 = [0.0795 - 0.0000i 0.0883 - 0.0000i 0.0185 - 0.0000i 0.1161 - 0.0000i 0.0153 - 0.0000i 0.0018 - 0.0000i 0.0139 - 0.0000i 0.0708 - 0.0000i 0.1737 - 0.0000i 0.8600 - 0.0000i]
AP40 = [0.0618 - 0.0000i 0.0830 - 0.0000i 0.0286 - 0.0000i 0.1008 - 0.0000i 0.0140 - 0.0000i 0.0018 - 0.0000i 0.0154 - 0.0000i 0.0774 - 0.0000i 0.1935 - 0.0000i 0.9352 - 0.0000i]
AP41 = [0.0454 - 0.0000i 0.0778 - 0.0000i 0.0454 - 0.0000i 0.0885 - 0.0000i 0.0128 - 0.0000i 0.0019 - 0.0000i 0.0171 - 0.0000i 0.0852 - 0.0000i 0.2176 - 0.0000i 0.9856 - 0.0000i]
AP42 = [0.0308 - 0.0000i 0.0728 - 0.0000i 0.0738 - 0.0000i 0.0784 - 0.0000i 0.0117 - 0.0000i 0.0020 - 0.0000i 0.0191 - 0.0000i 0.0943 - 0.0000i 0.2472 - 0.0000i 0.9943 - 0.0000i]
AP43 = [0.0191 - 0.0000i 0.0678 - 0.0000i 0.1230 - 0.0000i 0.0701 - 0.0000i 0.0106 - 0.0000i 0.0022 - 0.0000i 0.0214 - 0.0000i 0.1050 - 0.0000i 0.2837 - 0.0000i 0.9517 - 0.0000i]
AP44 = [0.0115 - 0.0000i 0.0629 - 0.0000i 0.2093 - 0.0000i 0.0630 - 0.0000i 0.0096 - 0.0000i 0.0024 - 0.0000i 0.0241 - 0.0000i 0.1178 - 0.0000i 0.3295 - 0.0000i 0.8632 - 0.0000i]
AP45 = [0.0098 - 0.0000i 0.0581 - 0.0000i 0.3580 - 0.0000i 0.0569 - 0.0000i 0.0087 - 0.0000i 0.0028 - 0.0000i 0.0271 - 0.0000i 0.1332 - 0.0000i 0.3872 - 0.0000i 0.7467 - 0.0000i]
AP46 = [0.0164 - 0.0000i 0.0533 - 0.0000i 0.5816 - 0.0000i 0.0517 - 0.0000i 0.0078 - 0.0000i 0.0033 - 0.0000i 0.0308 - 0.0000i 0.1520 - 0.0000i 0.4600 - 0.0000i 0.6234 - 0.0000i]
AP47 = [0.0349 - 0.0000i 0.0486 - 0.0000i 0.7982 - 0.0000i 0.0471 - 0.0000i 0.0070 - 0.0000i 0.0039 - 0.0000i 0.0351 - 0.0000i 0.1752 - 0.0000i 0.5512 - 0.0000i 0.5086 - 0.0000i]
AP48 = [0.0693 - 0.0000i 0.0438 - 0.0000i 0.8376 - 0.0000i 0.0430 - 0.0000i 0.0063 - 0.0000i 0.0046 - 0.0000i 0.0402 - 0.0000i 0.2042 - 0.0000i 0.6614 - 0.0000i 0.4100 - 0.0000i]
AP49 = [0.1244 - 0.0000i 0.0392 - 0.0000i 0.7093 - 0.0000i 0.0394 - 0.0000i 0.0056 - 0.0000i 0.0055 - 0.0000i 0.0464 - 0.0000i 0.2409 - 0.0000i 0.7847 - 0.0000i 0.3292 - 0.0000i]
AP50 = [0.2039 - 0.0000i 0.0345 - 0.0000i 0.5517 - 0.0000i 0.0361 - 0.0000i 0.0049 - 0.0000i 0.0067 - 0.0000i 0.0539 - 0.0000i 0.2880 - 0.0000i 0.9002 - 0.0000i 0.2646 - 0.0000i]
AP51 = [0.3076 - 0.0000i 0.0300 - 0.0000i 0.4269 - 0.0000i 0.0332 - 0.0000i 0.0044 - 0.0000i 0.0081 - 0.0000i 0.0632 - 0.0000i 0.3489 - 0.0000i 0.9699 - 0.0000i 0.2137 - 0.0000i]
AP52 = [0.4276 - 0.0000i 0.0256 - 0.0000i 0.3378 - 0.0000i 0.0304 - 0.0000i 0.0039 - 0.0000i 0.0099 - 0.0000i 0.0749 - 0.0000i 0.4279 - 0.0000i 0.9562 - 0.0000i 0.1736 - 0.0000i]
AP53 = [0.5455 - 0.0000i 0.0215 - 0.0000i 0.2749 - 0.0000i 0.0279 - 0.0000i 0.0035 - 0.0000i 0.0122 - 0.0000i 0.0897 - 0.0000i 0.5295 - 0.0000i 0.8568 - 0.0000i 0.1421 - 0.0000i]
AP54 = [0.6380 - 0.0000i 0.0177 - 0.0000i 0.2294 - 0.0000i 0.0255 - 0.0000i 0.0031 - 0.0000i 0.0150 - 0.0000i 0.1088 - 0.0000i 0.6549 - 0.0000i 0.7103 - 0.0000i 0.1172 - 0.0000i]
AP55 = [0.6870 - 0.0000i 0.0144 - 0.0000i 0.1955 - 0.0000i 0.0233 - 0.0000i 0.0029 - 0.0000i 0.0186 - 0.0000i 0.1340 - 0.0000i 0.7957 - 0.0000i 0.5610 - 0.0000i 0.0975 - 0.0000i]
AP56 = [0.6892 - 0.0000i 0.0118 - 0.0000i 0.1697 - 0.0000i 0.0213 - 0.0000i 0.0029 - 0.0000i 0.0233 - 0.0000i 0.1677 - 0.0000i 0.9230 - 0.0000i 0.4337 - 0.0000i 0.0818 - 0.0000i]
AP57 = [0.6537 - 0.0000i 0.0103 - 0.0000i 0.1493 - 0.0000i 0.0193 - 0.0000i 0.0030 - 0.0000i 0.0293 - 0.0000i 0.2137 - 0.0000i 0.9875 - 0.0000i 0.3339 - 0.0000i 0.0691 - 0.0000i]
AP58 = [0.5950 - 0.0000i 0.0104 - 0.0000i 0.1330 - 0.0000i 0.0174 - 0.0000i 0.0034 - 0.0000i 0.0371 - 0.0000i 0.2777 - 0.0000i 0.9522 - 0.0000i 0.2587 - 0.0000i 0.0589 - 0.0000i]
AP59 = [0.5256 - 0.0000i 0.0127 - 0.0000i 0.1195 - 0.0000i 0.0156 - 0.0000i 0.0041 - 0.0000i 0.0477 - 0.0000i 0.3673 - 0.0000i 0.8321 - 0.0000i 0.2025 - 0.0000i 0.0506 - 0.0000i]
AP60 = [0.4541 - 0.0000i 0.0184 - 0.0000i 0.1082 - 0.0000i 0.0139 - 0.0000i 0.0053 - 0.0000i 0.0619 - 0.0000i 0.4914 - 0.0000i 0.6789 - 0.0000i 0.1605 - 0.0000i 0.0438 - 0.0000i]

AP61 = [0.3854 - 0.0000i 0.0287 - 0.0000i 0.0985 - 0.0000i 0.0123 - 0.0000i 0.0070 - 0.0000i 0.0818 - 0.0000i 0.6529 - 0.0000i 0.5350 - 0.0000i 0.1288 - 0.0000i 0.0383 - 0.0000i]
AP62 = [0.3221 - 0.0000i 0.0456 - 0.0000i 0.0901 - 0.0000i 0.0108 - 0.0000i 0.0096 - 0.0000i 0.1099 - 0.0000i 0.8301 - 0.0000i 0.4174 - 0.0000i 0.1046 - 0.0000i 0.0337 - 0.0000i]
AP63 = [0.2652 - 0.0000i 0.0718 - 0.0000i 0.0826 - 0.0000i 0.0094 - 0.0000i 0.0133 - 0.0000i 0.1508 - 0.0000i 0.9550 - 0.0000i 0.3271 - 0.0000i 0.0860 - 0.0000i 0.0299 - 0.0000i]
AP64 = [0.2148 - 0.0000i 0.1104 - 0.0000i 0.0760 - 0.0000i 0.0082 - 0.0000i 0.0187 - 0.0000i 0.2115 - 0.0000i 0.9511 - 0.0000i 0.2592 - 0.0000i 0.0714 - 0.0000i 0.0268 - 0.0000i]
AP65 = [0.1708 - 0.0000i 0.1652 - 0.0000i 0.0699 - 0.0000i 0.0072 - 0.0000i 0.0265 - 0.0000i 0.3030 - 0.0000i 0.8266 - 0.0000i 0.2083 - 0.0000i 0.0600 - 0.0000i 0.0242 - 0.0000i]
AP66 = [0.1328 - 0.0000i 0.2389 - 0.0000i 0.0644 - 0.0000i 0.0064 - 0.0000i 0.0379 - 0.0000i 0.4392 - 0.0000i 0.6606 - 0.0000i 0.1698 - 0.0000i 0.0508 - 0.0000i 0.0220 - 0.0000i]
AP67 = [0.1006 - 0.0000i 0.3320 - 0.0000i 0.0592 - 0.0000i 0.0061 - 0.0000i 0.0549 - 0.0000i 0.6264 - 0.0000i 0.5115 - 0.0000i 0.1404 - 0.0000i 0.0434 - 0.0000i 0.0201 - 0.0000i]
AP68 = [0.0738 - 0.0000i 0.4394 - 0.0000i 0.0544 - 0.0000i 0.0063 - 0.0000i 0.0806 - 0.0000i 0.8292 - 0.0000i 0.3962 - 0.0000i 0.1177 - 0.0000i 0.0374 - 0.0000i 0.0186 - 0.0000i]
AP69 = [0.0519 - 0.0000i 0.5495 - 0.0000i 0.0499 - 0.0000i 0.0074 - 0.0000i 0.1204 - 0.0000i 0.9436 - 0.0000i 0.3115 - 0.0000i 0.0998 - 0.0000i 0.0325 - 0.0000i 0.0173 - 0.0000i]
AP70 = [0.0345 - 0.0000i 0.6465 - 0.0000i 0.0456 - 0.0000i 0.0097 - 0.0000i 0.1828 - 0.0000i 0.8945 - 0.0000i 0.2497 - 0.0000i 0.0856 - 0.0000i 0.0284 - 0.0000i 0.0162 - 0.0000i]
AP71 = [0.0214 - 0.0000i 0.7170 - 0.0000i 0.0416 - 0.0000i 0.0139 - 0.0000i 0.2811 - 0.0000i 0.7434 - 0.0000i 0.2043 - 0.0000i 0.0743 - 0.0000i 0.0250 - 0.0000i 0.0153 - 0.0000i]
AP72 = [0.0122 - 0.0000i 0.7556 - 0.0000i 0.0378 - 0.0000i 0.0208 - 0.0000i 0.4308 - 0.0000i 0.5845 - 0.0000i 0.1704 - 0.0000i 0.0650 - 0.0000i 0.0222 - 0.0000i 0.0146 - 0.0000i]
AP73 = [0.0063 - 0.0000i 0.7655 - 0.0000i 0.0342 - 0.0000i 0.0318 - 0.0000i 0.6326 - 0.0000i 0.4571 - 0.0000i 0.1447 - 0.0000i 0.0575 - 0.0000i 0.0199 - 0.0000i 0.0139 - 0.0000i]
AP74 = [0.0035 - 0.0000i 0.7547 - 0.0000i 0.0309 - 0.0000i 0.0492 - 0.0000i 0.8306 - 0.0000i 0.3636 - 0.0000i 0.1248 - 0.0000i 0.0513 - 0.0000i 0.0179 - 0.0000i 0.0134 - 0.0000i]
AP75 = [0.5261 - 0.0000i 0.4834 - 0.0000i 0.3659 - 0.0000i 0.6755 - 0.0000i 0.3654 - 0.0000i 0.4144 - 0.0000i 0.3990 - 0.0000i 0.4066 - 0.0000i 0.5913 - 0.0000i 0.4694 - 0.0000i]
AP76 = [0.0054 - 0.0000i 0.7022 - 0.0000i 0.0253 - 0.0000i 0.1180 - 0.0000i 0.8568 - 0.0000i 0.2469 - 0.0000i 0.0968 - 0.0000i 0.0418 - 0.0000i 0.0148 - 0.0000i 0.0126 - 0.0000i]
AP77 = [0.0092 - 0.0000i 0.6713 - 0.0000i 0.0232 - 0.0000i 0.1814 - 0.0000i 0.7271 - 0.0000i 0.2106 - 0.0000i 0.0869 - 0.0000i 0.0381 - 0.0000i 0.0136 - 0.0000i 0.0122 - 0.0000i]
AP78 = [0.0144 - 0.0000i 0.6413 - 0.0000i 0.0217 - 0.0000i 0.2745 - 0.0000i 0.5981 - 0.0000i 0.1833 - 0.0000i 0.0788 - 0.0000i 0.0351 - 0.0000i 0.0125 - 0.0000i 0.0120 - 0.0000i]
AP79 = [0.0206 - 0.0000i 0.6136 - 0.0000i 0.0210 - 0.0000i 0.4023 - 0.0000i 0.4942 - 0.0000i 0.1623 - 0.0000i 0.0722 - 0.0000i 0.0325 - 0.0000i 0.0117 - 0.0000i 0.0118 - 0.0000i]
AP80 = [0.0274 - 0.0000i 0.5887 - 0.0000i 0.0211 - 0.0000i 0.5576 - 0.0000i 0.4161 - 0.0000i 0.1460 - 0.0000i 0.0668 - 0.0000i 0.0303 - 0.0000i 0.0109 - 0.0000i 0.0116 - 0.0000i]
AP81 = [0.0346 - 0.0000i 0.5667 - 0.0000i 0.0223 - 0.0000i 0.7119 - 0.0000i 0.3583 - 0.0000i 0.1333 - 0.0000i 0.0623 - 0.0000i 0.0285 - 0.0000i 0.0103 - 0.0000i 0.0114 - 0.0000i]
AP82 = [0.0417 - 0.0000i 0.5477 - 0.0000i 0.0247 - 0.0000i 0.8254 - 0.0000i 0.3154 - 0.0000i 0.1232 - 0.0000i 0.0586 - 0.0000i 0.0269 - 0.0000i 0.0098 - 0.0000i 0.0113 - 0.0000i]
AP83 = [0.0487 - 0.0000i 0.5314 - 0.0000i 0.0281 - 0.0000i 0.8758 - 0.0000i 0.2834 - 0.0000i 0.1151 - 0.0000i 0.0556 - 0.0000i 0.0256 - 0.0000i 0.0093 - 0.0000i 0.0112 - 0.0000i]
AP84 = [0.0551 - 0.0000i 0.5178 - 0.0000i 0.0326 - 0.0000i 0.8728 - 0.0000i 0.2593 - 0.0000i 0.1088 - 0.0000i 0.0532 - 0.0000i 0.0246 - 0.0000i 0.0090 - 0.0000i 0.0111 - 0.0000i]
AP85 = [0.0609 - 0.0000i 0.5065 - 0.0000i 0.0379 - 0.0000i 0.8406 - 0.0000i 0.2412 - 0.0000i 0.1038 - 0.0000i 0.0512 - 0.0000i 0.0237 - 0.0000i 0.0087 - 0.0000i 0.0111 - 0.0000i]

AP86 = [0.0658 - 0.0000i   0.4976 - 0.0000i   0.0434 - 0.0000i   0.8001 - 0.0000i   0.2278 - 0.0000i   0.1000 - 0.0000i   0.0496 - 0.0000i   0.0230 - 0.0000i 0.0084 - 0.0000i   0.0110 - 0.0000i]
AP87 = [0.0697 - 0.0000i   0.4907 - 0.0000i   0.0487 - 0.0000i   0.7630 - 0.0000i   0.2182 - 0.0000i   0.0971 - 0.0000i   0.0485 - 0.0000i   0.0225 - 0.0000i 0.0082 - 0.0000i   0.0110 - 0.0000i]
AP88 = [0.0726 - 0.0000i   0.4859 - 0.0000i   0.0531 - 0.0000i   0.7349 - 0.0000i   0.2117 - 0.0000i   0.0952 - 0.0000i   0.0477 - 0.0000i   0.0221 - 0.0000i 0.0081 - 0.0000i   0.0110 - 0.0000i]
AP89 = [0.0744 - 0.0000i   0.4831 - 0.0000i   0.0560 - 0.0000i   0.7177 - 0.0000i   0.2079 - 0.0000i   0.0940 - 0.0000i   0.0472 - 0.0000i   0.0219 - 0.0000i 0.0080 - 0.0000i   0.0109 - 0.0000i]

APPENDIX B

Optical Constants

Table B-1 Complex refractive index of silicon nitride [20] across wavelengths of 5-14 µm

Wavelength	Refractive index	Extinction coefficient
5 µm	2.3307	0.0044500
6 µm	2.2236	0.032326
7 µm	2.1086	0.12714
8 µm	2.0014	0.23430
9 µm	1.7428	0.40538
10 µm	1.6270	1.1541
11 µm	2.2413	1.7133
12 µm	2.9507	1.7167
13 µm	3.4285	1.4148
14 µm	3.6647	1.0228

Table B-2 Complex refractive index of SiO_2 [20] across wavelengths of 5-14 µm

Wavelength	Refractive index	Extinction coefficient
5 µm	1.3475	0.00076000
6 µm	1.2713	0.0016067

7 µm	1.1145	0.0043028
8 µm	0.51386	0.27273
9 µm	0.59480	1.7675
10 µm	2.8118	0.53217
11 µm	1.9423	0.046344
12 µm	1.7325	0.18222
13 µm	1.7966	0.19896
14 µm	1.7778	0.092814

Table B-3 Complex refractive index of Cr [21] across wavelengths of 5-14 µm

Wavelength	Refractive Index	Extinction coefficient
5 µm	3.8227	16.020
6 µm	4.4218	19.319
7 µm	5.1522	22.542
8 µm	5.9866	25.693
9 µm	6.9467	28.750
10 µm	7.9877	31.721
11 µm	9.1354	34.582
12 µm	10.283	37.443
13 µm	11.8	29.8
14 µm	11.8	33.9

Table B-4 Complex refractive index of VOx [22] across wavelengths of 5-14 µm

Wavelength	Refractive index	Extinction coefficient
5 µm	2.65	0.0408
6 µm	2.57	0.0312
7 µm	2.50	0.0343
8 µm	2.40	0.0224
9 µm	2.27	0.0205
10 µm	2.08	0.0186
11 µm	1.80	0.0230
12 µm	1.26	0.121
13 µm	0.543	1.17
14 µm	1.16	2.04

Table B-5 Complex refractive index of V_2O_5 across wavelengths of 5-14 µm

Wavelength	Refractive index	Extinction coefficient
5 µm	1.97	0.0267
6 µm	1.90	0.0133
7 µm	1.81	0.0533
8 µm	1.66	0.107
9 µm	1.41	0.233
10 µm	1.18	0.553
11 µm	1.12	1.05
12 µm	1.45	1.55
13 µm	1.88	1.65
14 µm	2.06	1.62

Table B-6 Complex refractive index of Au [23] across wavelengths of 5-14 μm

Wavelength	Refractive index	Extinction coefficient
5 μm	3.0026	34.306
6 μm	4.2567	40.943
7 μm	5.6919	47.430
8 μm	7.2913	53.774
9 μm	9.0304	59.948
10 μm	10.895	65.950
11 μm	12.851	71.771
12 μm	14.910	77.470
13 μm	17.024	82.970
14 μm	19.182	88.286

Table B-7 Complex refractive index of Ti [24] across the wavelengths of 5-14 μm

Wavelength	Refractive index	Extinction coefficient
5 μm	2.3661	8.7896
6 μm	2.2765	11.249
7 μm	2.6630	13.616
8 μm	3.2049	15.799
9 μm	3.6382	17.732
10 μm	4.0716	19.664
11 μm	4.5449	21.597
12 μm	5.0428	23.455
13 μm	5.5561	25.281
14 μm	6.0820	27.081

Table B-8 Complex refractive index of VO_2 (semiconductor) [25] across the wavelengths of 5-14 μm

Wavelength	n	k
5 μm	2.9	0.007
7 μm	2.8	0.005
8 μm	2.7	0.005
9 μm	2.7	0.005
10 μm	2.5	0.05
11 μm	2.5	0.2
12.5 μm	2.5	0.75

Table B-9 Complex refractive index of Ge [26] across the wavelengths of 5-14 μm

Wavelength	Refractive Index	Extinction Coefficient
5 μm	4.0162	0.00
6 μm	4.0115	0.00
7 μm	4.0086	0.00
8 μm	4.0067	0.00
9 μm	4.0034	0.00
10 μm	4.0025	0.00
11 μm	4.0017	0.00
12 μm	4.0012	0.00
13 μm	4.0008	0.00
14 μm	4.0004	0.012

Table B-10 Complex refractive index of ZnS [27] across the wavelengths of 5-14 µm

Wavelength	Refractive Index	Extinction Coefficient
5 µm	2.2480	0.0010000
6 µm	2.2383	0.0000
7 µm	2.2304	0.0030000
8 µm	2.2220	0.0030000
9 µm	2.2121	0.0030000
10 µm	2.1990	0.0020000
11 µm	2.1823	0.0020000
12 µm	2.1650	0.0040000
13 µm	2.1447	0.0060000
14 µm	2.1225	0.010560

Table B-11 Complex refractive index of Alumina [28] across the wavelengths of 5-14 µm

Wavelength	Refractive Index (n)	Extinction coefficient (k)
5 µm	1.5242	0.0039300
6 µm	1.4684	0.0081900
7 µm	1.3924	0.016647
8 µm	1.2861	0.034564
9 µm	1.1292	0.077808
10 µm	0.88168	0.21175

11 µm	0.66048	0.68319
12 µm	0.97300	1.2932
13 µm	1.7735	1.3044
14 µm	1.9458	0.70245

Table B-12 Complex refractive index of Aluminum across the wavelengths of 5-14 µm

Wavelength	n	k
5 µm	9.1528	47.199
6 µm	11.681	55.516
7 µm	14.435	63.753
8 µm	17.680	71.765
9 µm	21.361	79.241
10 µm	25.006	85.965
11 µm	28.576	92.245
12 µm	32.109	98.755
13 µm	35.676	104.63
14 µm	39.152	110.19

Table B-13 Complex refractive index of Silicon [29] across the wavelengths of 5-14 µm

Wavelength	Refractive Index (n)	Extinction coefficient (k)
5 µm	3.4225	0.00
6 µm	3.4207	0.00

7 µm	3.4196	0.000024257
8 µm	3.4189	0.000020100
9 µm	3.4184	0.000075578
10 µm	3.4181	0.000074000
11 µm	3.4178	0.00018982
12 µm	3.4176	0.00015133
13 µm	3.4175	0.00022615
14 µm	3.4174	0.00016444

APPENDIX C

$$E_i(x,z) = a_y E_{io} e^{-j\beta_1(x\sin\theta_i + z\cos\theta_i)} \quad \text{.......(2.1.1)}$$

$$H_i(x,z) = \frac{E_{io}}{\eta_1}(-a_x\cos\theta_i + a_z\sin\theta_i)e^{-j\beta_1(x\sin\theta_i + z\cos\theta_i)} \quad \text{.......(2.1.2)}$$

$$E_r(x,z) = a_y E_{ro} e^{-j\beta_1(x\sin\theta_r + z\cos\theta_r)} \quad \text{.......(2.1.3)}$$

$$H_r(x,z) = \frac{E_{ro}}{\eta_1}(a_x\cos\theta_r + a_z\sin\theta_r)e^{-j\beta_1(x\sin\theta_r + z\cos\theta_r)} \quad \text{.......(2.1.4)}$$

$$E_t(x,z) = a_y E_{to} e^{-j\beta_2(x\sin\theta_t + z\cos\theta_t)} \quad \text{.......(2.1.5)}$$

$$H_t(x,z) = \frac{E_{to}}{\eta_2}(-a_x\cos\theta_t + a_z\sin\theta_t)e^{-j\beta_2(x\sin\theta_t + z\cos\theta_t)} \quad \text{.......(2.1.6)}$$

$$E_{tr}(x,z) = a_y E_{tro} e^{-j\beta_2(x\sin\theta_{tr} - z\cos\theta_{tr})} \quad \text{.......(2.1.7)}$$

$$H_{tr}(x,z) = \frac{E_{tro}}{\eta_2}(a_x\cos\theta_{tr} + a_z\sin\theta_{tr})e^{-j\beta_2(x\sin\theta_{tr} - z\cos\theta_{tr})} \quad \text{.......(2.1.8)}$$

$$E_{tt}(x,z) = a_y E_{tto} e^{-j\beta_3(x\sin\theta_{tt} + z\cos\theta_{tt})} \quad \text{.......(2.1.9)}$$

$$H_{tt}(x,z) = \frac{E_{tto}}{\eta_3}(-a_x\cos\theta_{tt} + a_z\sin\theta_{tt})e^{-j\beta_3(x\sin\theta_{tt} + z\cos\theta_{tt})} \quad \text{.......(2.1.10)}$$

$(i) z = 0$

$$E_{iy}(x,0) + E_{ry}(x,0) = E_{ty}(x,0)$$

$$\Rightarrow E_{io} e^{-j\beta_1 x\sin\theta_i} + E_{ro} e^{-j\beta_1 x\sin\theta_r} = E_{to} e^{-j\beta_2 x\sin\theta_t} \quad \text{.......(2.1.11)}$$

$$H_{ix}(x,0)+H_{rx}(x,0)=H_{tx}(x,0)$$

$$=> \frac{1}{\eta_1}(-E_{io}\cos\theta_i e^{-j\beta_1 x\sin\theta_i}+E_{ro}\cos\theta_r e^{-j\beta_1 x\sin\theta_r})=-\frac{E_{to}}{\eta_2}\cos\theta_t e^{-j\beta_2 x\sin\theta_t}\text{.......................}(2.1.12)$$

$(ii) z=d$

$$E_{ty}(x,d)+E_{try}(x,d)=E_{tty}(x,d)$$

$$=> a_y E_{to}e^{-j\beta_2(x\sin\theta_t+d\cos\theta_t)}+a_y E_{tro}e^{-j\beta_2(x\sin\theta_{tr}-d\cos\theta_{tr})}=a_y E_{tto}e^{-j\beta_3(x\sin\theta_{tt}+d\cos\theta_{tt})}\text{..................}(2.1.13)$$

$$H_{tx}(x,d)+H_{trx}(x,d)=H_{ttx}(x,d)$$

$$=> \frac{E_{to}}{\eta_2}(-a_x\cos\theta_t+a_z\sin\theta_t)e^{-j\beta_2(x\sin\theta_t+d\cos\theta_t)}+\frac{E_{tro}}{\eta_2}(a_x\cos\theta_{tr}+a_z\sin\theta_{tr})e^{-j\beta_2(x\sin\theta_{tr}-d\cos\theta_{tr})}=\frac{E_{tto}}{\eta_3}(-a_x\cos\theta_{tt}+a_z\sin\theta_{tt})e^{-j\beta_3(x\sin\theta_{tt}+d\cos\theta_{tt})}$$
..............(2.1.14)

$$\beta_1 x\sin\theta_i=\beta_1 x\sin\theta_r=\beta_2 x\sin\theta_t\text{..................}(2.1.15)$$

$$\frac{\sin\theta_t}{\sin\theta_i}=\frac{\beta_1}{\beta_2}=\frac{\eta_1}{\eta_2}\text{..................}(2.1.16)$$

Snell's law,

$$\theta_i=\theta_r=\theta\text{..................}(2.1.17)$$

$$E_{io}+E_{ro}=E_{to}\text{..................}(2.1.18)$$

$$\frac{1}{\eta_1}(E_{io}-E_{ro})\cos\theta_i=\frac{E_{to}}{\eta_2}\cos\theta_t \quad \text{.......(2.1.19)}$$

$$\begin{pmatrix} E_{to} \\ \frac{E_{to}}{\eta_2}\cos\theta_t \end{pmatrix}=\begin{pmatrix} 1 & 1 \\ \frac{\cos\theta}{\eta_1} & -\frac{\cos\theta}{\eta_1} \end{pmatrix}\begin{pmatrix} E_{io} \\ E_{ro} \end{pmatrix}=\begin{pmatrix} 1 & 1 \\ \frac{\cos\theta}{\eta_1} & -\frac{\cos\theta}{\eta_1} \end{pmatrix}\begin{pmatrix} E_{1+} \\ E_{1-} \end{pmatrix} \quad \text{.......(2.1.20)}$$

$$E_{io}=E_{1+};E_{ro}=E_{1-} \quad \text{.......(2.1.21)}$$

$$E_{1+}=e^{j\beta_Z d}E_{2+} \quad \text{.......(2.1.22)}$$

$$E_{1-}=e^{-j\beta_Z d}E_{2-} \quad \text{.......(2.1.23)}$$

$$\begin{pmatrix} E_{1+} \\ E_{1-} \end{pmatrix}=\begin{pmatrix} e^{j\beta_Z d} & 0 \\ 0 & e^{-j\beta_Z d} \end{pmatrix}\begin{pmatrix} E_{2+} \\ E_{2-} \end{pmatrix} \quad \text{.......(2.1.24)}$$

$$E_{2+}=\frac{1}{2}[E_2+\frac{\eta_1}{\cos\theta}H_2] \quad \text{.......(2.1.25)}$$

$$E_{2-}=\frac{1}{2}[E_2-\frac{\eta_1}{\cos\theta}H_2] \quad \text{.......(2.1.26)}$$

$$\begin{pmatrix} E_{2+} \\ E_{2-} \end{pmatrix}=\frac{1}{2}\begin{pmatrix} 1 & \frac{\eta_1}{\cos\theta} \\ 1 & -\frac{\eta_1}{\cos\theta} \end{pmatrix}\begin{pmatrix} E_2 \\ H_2 \end{pmatrix} \quad \text{.......(2.1.27)}$$

$$\begin{pmatrix} E_{1+} \\ E_{1-} \end{pmatrix}=\begin{pmatrix} e^{j\beta_Z d} & 0 \\ 0 & e^{-j\beta_Z d} \end{pmatrix}\frac{1}{2}\begin{pmatrix} 1 & \frac{\eta_1}{\cos\theta} \\ 1 & -\frac{\eta_1}{\cos\theta} \end{pmatrix}\begin{pmatrix} E_2 \\ H_2 \end{pmatrix} \quad \text{.......(2.1.28)}$$

$$\begin{pmatrix} E_{to} \\ \frac{E_{to}}{\eta_2}\cos\theta_t \end{pmatrix}=\begin{pmatrix} 1 & 1 \\ \frac{\cos\theta}{\eta_1} & -\frac{\cos\theta}{\eta_1} \end{pmatrix}\begin{pmatrix} e^{j\beta_Z d} & 0 \\ 0 & e^{-j\beta_Z d} \end{pmatrix}\frac{1}{2}\begin{pmatrix} 1 & \frac{\eta_1}{\cos\theta} \\ 1 & -\frac{\eta_1}{\cos\theta} \end{pmatrix}\begin{pmatrix} E_2 \\ H_2 \end{pmatrix} \quad \text{.......(2.1.29)}$$

$$\begin{pmatrix} E_{to} \\ \frac{E_{to}}{\eta_2}\cos\theta_t \end{pmatrix}=\begin{pmatrix} \cos\beta_Z d & j\frac{\eta_1}{\cos\theta}\sin\beta_Z d \\ j(\frac{\eta_1}{\cos\theta})^{-1}\sin\beta_Z d & \cos\beta_Z d \end{pmatrix}\begin{pmatrix} E_2 \\ H_2 \end{pmatrix} \quad \text{.......(2.1.30)}$$

APPENDIX D

$$E_i(x,z) = E_{io}(a_x \cos\theta_i - a_z \sin\theta_i) e^{-j\beta_1(x\sin\theta_i + z\cos\theta_i)} \quad (2.2.1)$$

$$H_i(x,z) = a_y \frac{E_{io}}{\eta_1} e^{-j\beta_1(x\sin\theta_i + z\cos\theta_i)} \quad (2.2.2)$$

$$E_r(x,z) = E_{ro}(a_x \cos\theta_r + a_z \sin\theta_r) e^{-j\beta_1(x\sin\theta_r - z\cos\theta_r)} \quad (2.2.3)$$

$$H_r(x,z) = -a_y \frac{E_{ro}}{\eta_1} e^{-j\beta_1(x\sin\theta_r - z\cos\theta_r)} \quad (2.2.4)$$

$$E_t(x,z) = E_{to}(a_x \cos\theta_t - a_z \sin\theta_t) e^{-j\beta_2(x\sin\theta_t + z\cos\theta_t)} \quad (2.2.5)$$

$$H_t(x,z) = a_y \frac{E_{to}}{\eta_2} e^{-j\beta_2(x\sin\theta_t + z\cos\theta_t)} \quad (2.2.6)$$

$$E_{tr}(x,z) = E_{tro}(a_x \cos\theta_{tr} + a_z \sin\theta_{tr}) e^{-j\beta_2(x\sin\theta_{tr} - z\cos\theta_{tr})} \quad (2.2.7)$$

$$H_{tr}(x,z) = -a_y \frac{E_{tro}}{\eta_1} e^{-j\beta_2(x\sin\theta_{tr} - z\cos\theta_{tr})} \quad (2.2.8)$$

$$E_{tt}(x,z) = E_{tto}(a_x \cos\theta_{tt} - a_z \sin\theta_{tt}) e^{-j\beta_3(x\sin\theta_{tt} + z\cos\theta_{tt})} \quad (2.2.9)$$

$$H_{tt}(x,z) = a_y \frac{E_{tto}}{\eta_3} e^{-j\beta_3(x\sin\theta_{tt} + z\cos\theta_{tt})} \quad (2.2.10)$$

$(i) z = 0$

$$E_i(x,0) + E_r(x,0) = E_t(x,0)$$

$$\Rightarrow E_{io}\cos\theta_i e^{-j\beta_1 x\sin\theta_i} + E_{ro}\cos\theta_r e^{-j\beta_1 x\sin\theta_r} = E_{to}\cos\theta_t e^{-j\beta_2 x\sin\theta_t} \quad (2.2.11)$$

$$H_{ix}(x,0) + H_{rx}(x,0) = H_{tx}(x,0)$$

$$> \frac{1}{\eta_1}(E_{io}e^{-j\beta_1 x\sin\theta_i} - E_{ro}e^{-j\beta_1 x\sin\theta_r}) = \frac{E_{to}}{\eta_2}e^{-j\beta_2 x\sin\theta_t} \text{...}(2.2.12)$$

$(ii) z = d$

$E_t(x,d) + E_{tr}(x,d) = E_{tt}(x,d)$

$$=> E_{to}(a_x\cos\theta_t - a_z\sin\theta_t)e^{-j\beta_2(x\sin\theta_t + d\cos\theta_t)} + E_{tro}(a_x\cos\theta_{tr} + a_z\sin\theta_{tr})e^{-j\beta_2(x\sin\theta_{tr} - d\cos\theta_{tr})} = E_{tto}(a_x\cos\theta_{tt} - a_z\sin\theta_{tt})e^{-j\beta_3(x\sin\theta_{tt} + d\cos\theta_{tt})}$$
..................(2.2.13)

$H_{tx}(x,d) + H_{trx}(x,d) = H_{ttx}(x,d)$

$$=> a_y\frac{E_{to}}{\eta_2}e^{-j\beta_2(x\sin\theta_t + d\cos\theta_t)} - a_y\frac{E_{tro}}{\eta_1}e^{-j\beta_2(x\sin\theta_{tr} - d\cos\theta_{tr})} = a_y\frac{E_{tto}}{\eta_3}e^{-j\beta_3(x\sin\theta_{tt} + d\cos\theta_{tt})} \text{..................................}(2.2.14)$$

$$\beta_1 x\sin\theta_i = \beta_1 x\sin\theta_r = \beta_2 x\sin\theta_t \text{...}(2.2.15)$$

$$\frac{\sin\theta_t}{\sin\theta_i} = \frac{\beta_1}{\beta_2} = \frac{\eta_1}{\eta_2} \text{...}(2.2.16)$$

Snell's law,

$$\theta_i = \theta_r = \theta \text{...}(2.2.17)$$

$$(E_{io} + E_{ro})\cos\theta = E_{to}\cos\theta_t \text{...}(2.2.18)$$

$$\frac{1}{\eta_1}(E_{io} - E_{ro}) = \frac{E_{to}}{\eta_2} \text{...}(2.2.19)$$

$$\begin{pmatrix} E_{to} \\ \frac{E_{to}}{\eta_2}\cos\theta_t \end{pmatrix} = \begin{pmatrix} \cos\theta & \cos\theta \\ \frac{1}{\eta_1} & -\frac{1}{\eta_1} \end{pmatrix}\begin{pmatrix} E_{io} \\ E_{ro} \end{pmatrix} = \begin{pmatrix} \cos\theta & \cos\theta \\ \frac{1}{\eta_1} & -\frac{1}{\eta_1} \end{pmatrix}\begin{pmatrix} E_{1+} \\ E_{1-} \end{pmatrix} \text{...}(2.2.20)$$

$$E_{io} = E_{1+}; E_{ro} = E_{1-} \text{..}(2.2.21)$$

$$E_{1+} = e^{j\beta_Z d} E_{2+} \quad \text{(2.2.22)}$$

$$E_{1-} = e^{-j\beta_Z d} E_{2-} \quad \text{(2.2.23)}$$

$$\begin{pmatrix} E_{1+} \\ E_{1-} \end{pmatrix} = \begin{pmatrix} e^{j\beta_Z d} & 0 \\ 0 & e^{-j\beta_Z d} \end{pmatrix} \begin{pmatrix} E_{2+} \\ E_{2-} \end{pmatrix} \quad \text{(2.2.24)}$$

$$E_{2+} = \frac{1}{2}[\frac{E_2}{\cos\theta} + \eta_1 H_2] \quad \text{(2.2.25)}$$

$$E_{2-} = \frac{1}{2}[\frac{E_2}{\cos\theta} - \eta_1 H_2] \quad \text{(2.2.26)}$$

$$\begin{pmatrix} E_{2+} \\ E_{2-} \end{pmatrix} = \frac{1}{2} \begin{pmatrix} \frac{1}{\cos\theta} & \eta_1 \\ \frac{1}{\cos\theta} & -\eta_1 \end{pmatrix} \begin{pmatrix} E_2 \\ H_2 \end{pmatrix} \quad \text{(2.2.27)}$$

$$\begin{pmatrix} E_{1+} \\ E_{1-} \end{pmatrix} = \begin{pmatrix} e^{j\beta_Z d} & 0 \\ 0 & e^{-j\beta_Z d} \end{pmatrix} \frac{1}{2} \begin{pmatrix} \frac{1}{\cos\theta} & \eta_1 \\ \frac{1}{\cos\theta} & -\eta_1 \end{pmatrix} \begin{pmatrix} E_2 \\ H_2 \end{pmatrix} \quad \text{(2.2.28)}$$

$$\begin{pmatrix} E_{to} \\ \frac{E_{to}}{\eta_2}\cos\theta_t \end{pmatrix} = \begin{pmatrix} \cos\theta & \cos\theta \\ \frac{1}{\eta_1} & -\frac{1}{\eta_1} \end{pmatrix} \begin{pmatrix} e^{j\beta_Z d} & 0 \\ 0 & e^{-j\beta_Z d} \end{pmatrix} \frac{1}{2} \begin{pmatrix} \frac{1}{\cos\theta} & \eta_1 \\ \frac{1}{\cos\theta} & -\eta_1 \end{pmatrix} \begin{pmatrix} E_2 \\ H_2 \end{pmatrix} \quad \text{(2.2.29)}$$

$$\begin{pmatrix} E_{to} \\ \frac{E_{to}}{\eta_2}\cos\theta_t \end{pmatrix} = \begin{pmatrix} \cos\beta_Z d & j(\eta_1\cos\theta)\sin\beta_Z d \\ j(\eta_1\cos\theta)^{-1}\sin\beta_Z d & \cos\beta_Z d \end{pmatrix} \begin{pmatrix} E_2 \\ H_2 \end{pmatrix} \quad \text{(2.2.30)}$$

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