

---

## Table of Contents

|  |   |
|--|---|
| ECE 8873 - Homework 1, Problem 3 ..... | 1 |
| Part A .....                           | 1 |
| Part B Calculations .....              | 1 |
| Generate Plots .....                   | 2 |

## ECE 8873 - Homework 1, Problem 3

Caitlyn Caggia

```
clear all; close all;

% Given Values
epR = 2.5;
sigma = 0.0005;
f = 3e9;

% Constants
eta0 = 377;
ep0 = 8.85e-12;
mu0 = (4*pi)*10^(-7);
```

### Part A

```
% Calculate Angles
thetai = linspace(0,90,500);
thetat = asind(1./sqrt(epR).*sind(thetai));

% Calculate Reflection Coefficients
omega = 2*pi*f;
eta = sqrt(mu0/(ep0*2.5 - j*sigma/omega));
gammaTE = (eta.*cosd(thetai) - eta0.*cosd(thetat)) ./ ...
    (eta.*cosd(thetai) + eta0.*cosd(thetat));
gammaTM = (-eta0.*cosd(thetai) + eta.*cosd(thetat)) ./ ...
    (eta0.*cosd(thetai) + eta.*cosd(thetat));
```

### Part B Calculations

```
% New Values
sigmab = 4;
epRb = 81;

% Calculate Angles
thetai = linspace(0,90,500);
thetat = asind(1./sqrt(epRb).*sind(thetai));

% Calculate Reflection Coefficients
```

---

```

omegab = 2*pi*f;
etab = sqrt(mu0/(ep0*2.5 - j*sigmab/omegab));
gammaTEb = (etab.*cosd(thetai) - eta0.*cosd(thetat)) ./ ...
    (etab.*cosd(thetai) + eta0.*cosd(thetat));
gammaTMb = (-eta0.*cosd(thetai) + etab.*cosd(thetat)) ./ ...
    (eta0.*cosd(thetai) + etab.*cosd(thetat));

```

## Generate Plots

```

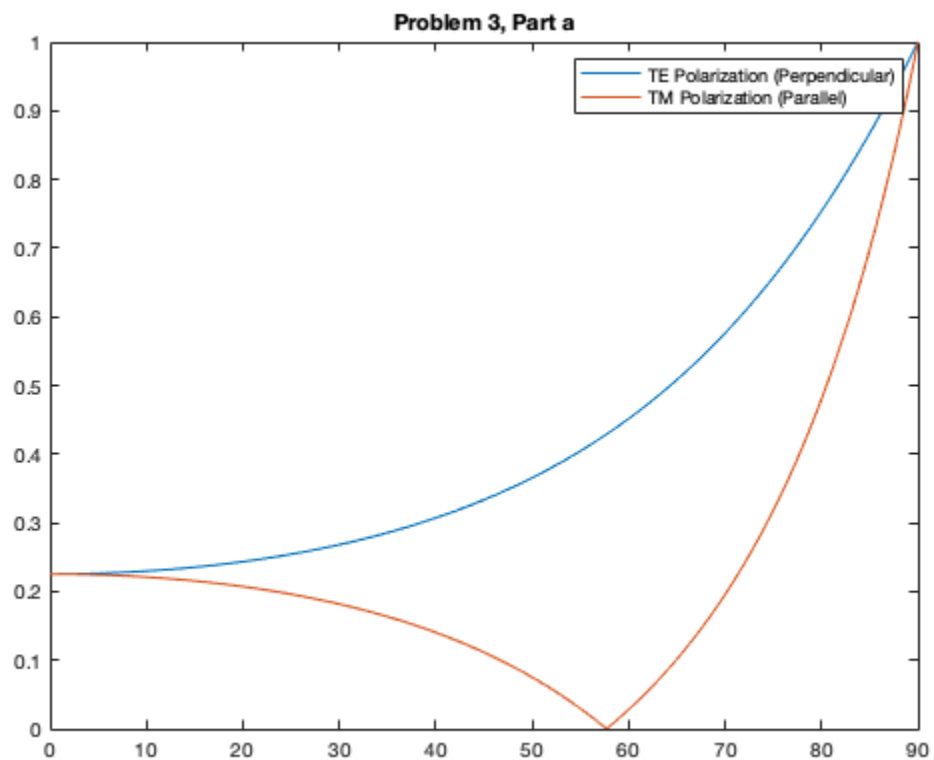
figure
plot(thetai, abs(gammaTE), thetai, abs(gammaTM))
legend('TE Polarization (Perpendicular)', 'TM Polarization (Parallel)')
title('Problem 3, Part a')

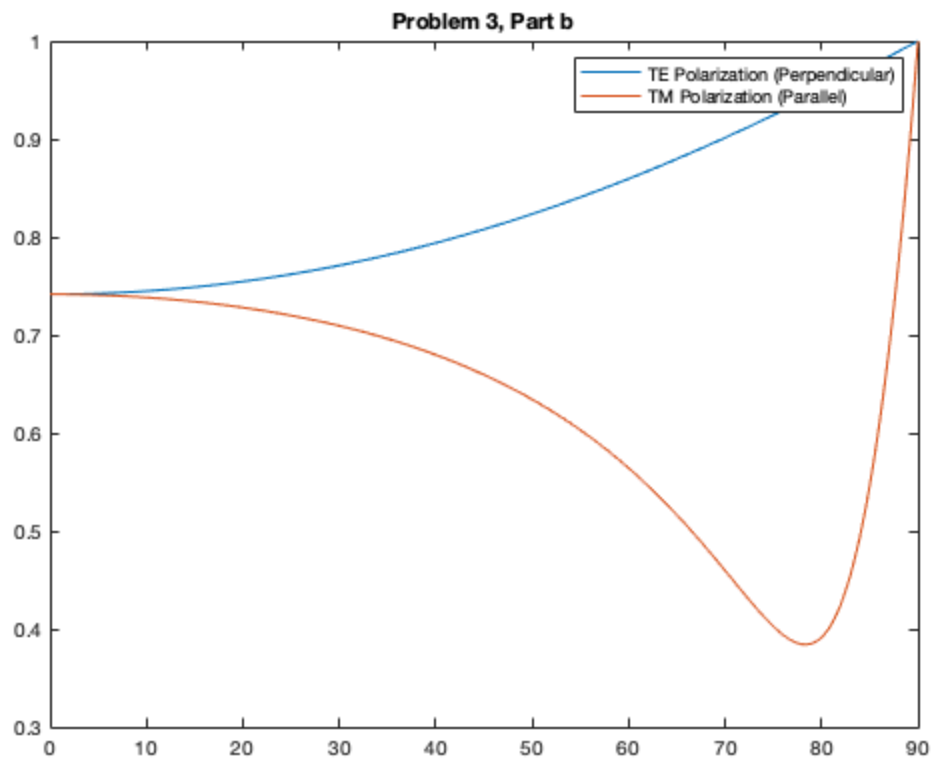
```

```

figure
plot(thetai, abs(gammaTEb), thetai, abs(gammaTMb))
legend('TE Polarization (Perpendicular)', 'TM Polarization (Parallel)')
title('Problem 3, Part b')

```





*Published with MATLAB® R2018a*