

Coding Program for Plots

Characteristic impedance variation of CPW vs k
varying dielectric constant

```
er=[]
h=int(input('Enter the no of values given as input:'))
for i in range (h):
    c=float(input("Enter the values of dielectric constant: "))
    er.append(c)
k=np.linspace(0.1,0.8,50)
plt.figure(figsize=(15,12));
for i in range(h):
    Z=(30*(math.pi**2)/np.sqrt((er[i]+1)/2))*((np.log(2*((1+np.sqrt(k))/(1-np.sqrt(k))))))**(-1))
    plt.plot(k,Z,label='er={0:0.2f}'.format(er[i]));
    plt.legend()
plt.xticks(fontsize=14);
plt.yticks(fontsize=14);
plt.title("Characteristic Impedance of CPW vs k with varying er",fontsize=25)
plt.ylabel('Impedance (Ohms)',fontsize=25)
plt.xlabel('K=s/(s+2w)',fontsize=25)
```

Effective dielectric constant variation of CPW as function of h/w

```
k=[]
```

```
for i in range(h):
```

```
    c=float(input("Enter the values of k: "))
```

```
    k.append(c)
```

```
x=np.linspace(1,7,50)
```

```
plt.figure(figsize=(15,12));
```

```
er=float(input("enter the value of er:"))
```

```
for i in range(h):
```

```
n=(np.tanh(0.775*np.log(x)+1.75))+(k[i]/x)*(0.04-  
0.7*k[i]+0.01*((1-0.01*er)*(0.25+k[i])))
```

```
    plt.plot(x,n,'.-',label='k={0:0.3f}'.format(k[i]));
```

```
    plt.legend()
```

```
    plt.xticks(fontsize=14);
```

```
    plt.yticks(fontsize=14);
```

```
    plt.title("Effective dielectric constant variation of CPW  
as a function of  $h/w$ ",fontsize=25)
```

```
    plt.ylabel("E'r/Er",fontsize=25)
```

```
    plt.xlabel('h/w',fontsize=25)
```

Normalized impedance of CPW variation as function of h/w

```
x=np.linspace(1,7,50)
plt.figure(figsize=(15,12));
er=float(input("enter the value of er:"))
for i in range(h):
    n=(np.tanh(0.775*np.log(x)+1.75))+k[i]/x*(0.04-
0.7*k[i]+0.01*((1-0.01*er)*(0.25+k[i])))
    Z=np.sqrt(1/n)
    plt.plot(x,Z,'-',label='k={0:0.2f}'.format(k[i]));
plt.legend()
plt.xticks(fontsize=14);
plt.yticks(fontsize=14);
plt.title("Normalised impedance variation of cpw as a
function of h/w",fontsize=25)
plt.ylabel("Normalised impedance",fontsize=25)
plt.xlabel('h/w',fontsize=25)
```