

Reto F3001C

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```
%Code Variables
%Sizes
sXs = [1000,930,475,405];
sYs = [325,235,955,730];

%Paths
SuperiorPath = "../Phase4V2/Sweeps/Matlab/";
FundamentalPath = "../Phase3/Sweeps/Matlab/";

%Modes
Superior = "Waveguide%i_%i_532_Mode%i";
Fundamental = "Waveguide%i_%i_1596";
ModesSup = [15,9,19,12];

warning('off','MATLAB:polyfit:RepeatedPointsOrRescale')
```

Waveguide selector:

```
sel = 4;
nmodes = ModesSup(sel);
mode = 12;
disp("Selected waveguide:")
```

Selected waveguide:

```
disp("    Size: "+num2str(sXs(sel))+ "x" +num2str(sYs(sel)));
```

Size: 405x730

```
disp("    Mode: "+num2str(mode));
```

Mode: 12

Waveguide Summary:

```
disp("Waveguide: "+num2str(sXs(sel))+ "x" +num2str(sXs(sel))+ ", mode: "+num2str(ModesSup(sel)));
```

Waveguide: 405x405, mode: 12

Fundamental Mode Data (1596nm):

```
file = sprintf(Fundamental,sXs(sel)*1000,sYs(sel)*1000);
load(FundamentalPath+file);
wgFundamental = waveguide(lambda,neff);
l = wgFundamental.lambdaData;
w = wgFundamental.omegaData;
```

```
neff = wgFundamental.neffData;
```

Ranges:

```
disp("Lambda Ranges: "+num2str(min(l))+"-"+num2str(max(l))+"");
```

Lambda Ranges: 1.53-1.596

```
disp("Omega Ranges: "+num2str(min(w))+"-"+num2str(max(w))+"");
```

Omega Ranges: 1181049869.7706-1231997119.0548

Neff vs ω/λ

```
disp("Function neff( $\lambda$ ):");
```

Function neff(λ):

```
disp(wgFundamental.nefflStr);
```

-0.000032618120069393180993251591* $l.^{30}+0.000160183850449802019652936758*l.^{29}-0.000165516382843027400149221728*l.^{28}+0.000165516382843027400149221728*l.^{27}-0.000165516382843027400149221728*l.^{26}+0.000165516382843027400149221728*l.^{25}-0.000165516382843027400149221728*l.^{24}+0.000165516382843027400149221728*l.^{23}-0.000165516382843027400149221728*l.^{22}+0.000165516382843027400149221728*l.^{21}-0.000165516382843027400149221728*l.^{20}+0.000165516382843027400149221728*l.^{19}-0.000165516382843027400149221728*l.^{18}+0.000165516382843027400149221728*l.^{17}-0.000165516382843027400149221728*l.^{16}+0.000165516382843027400149221728*l.^{15}-0.000165516382843027400149221728*l.^{14}+0.000165516382843027400149221728*l.^{13}-0.000165516382843027400149221728*l.^{12}+0.000165516382843027400149221728*l.^{11}-0.000165516382843027400149221728*l.^{10}+0.000165516382843027400149221728*l.^{9}-0.000165516382843027400149221728*l.^{8}+0.000165516382843027400149221728*l.^{7}-0.000165516382843027400149221728*l.^{6}+0.000165516382843027400149221728*l.^{5}-0.000165516382843027400149221728*l.^{4}+0.000165516382843027400149221728*l.^{3}-0.000165516382843027400149221728*l.^{2}+0.000165516382843027400149221728*l.^{1}-0.000165516382843027400149221728$

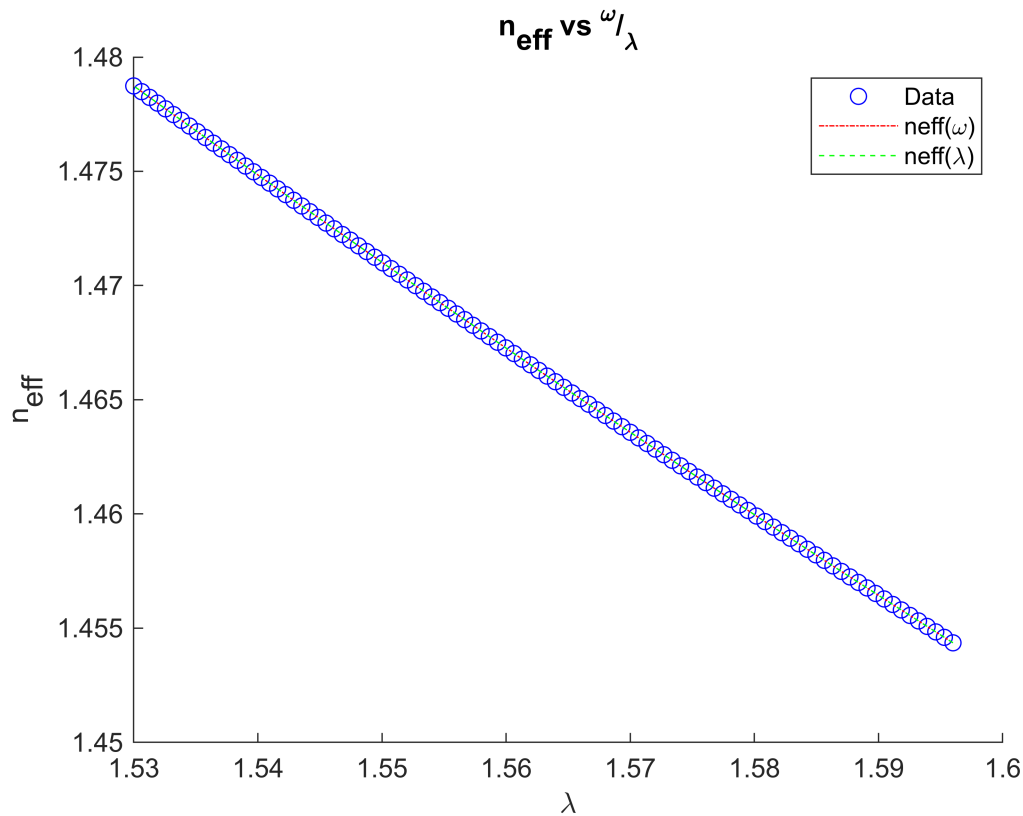
```
disp("Function neff( $w$ ):");
```

Function neff(w)

```
disp(wgFundamental.neffwStr);
```

1.747346577041554230953220300498e-271*w.^30-7.662539294564936012074625087400e-262*w.^29+8.2570187366759027814978047e-253*w.^28-8.2570187366759027814978047e-244*w.^27+8.2570187366759027814978047e-235*w.^26-8.2570187366759027814978047e-226*w.^25+8.2570187366759027814978047e-217*w.^24-8.2570187366759027814978047e-208*w.^23+8.2570187366759027814978047e-199*w.^22-8.2570187366759027814978047e-190*w.^21+8.2570187366759027814978047e-181*w.^20-8.2570187366759027814978047e-172*w.^19+8.2570187366759027814978047e-163*w.^18-8.2570187366759027814978047e-154*w.^17+8.2570187366759027814978047e-145*w.^16-8.2570187366759027814978047e-136*w.^15+8.2570187366759027814978047e-127*w.^14-8.2570187366759027814978047e-118*w.^13+8.2570187366759027814978047e-109*w.^12-8.2570187366759027814978047e-100*w.^11+8.2570187366759027814978047e-91*w.^10-8.2570187366759027814978047e-82*w.^9+8.2570187366759027814978047e-73*w.^8-8.2570187366759027814978047e-64*w.^7+8.2570187366759027814978047e-55*w.^6-8.2570187366759027814978047e-46*w.^5+8.2570187366759027814978047e-37*w.^4-8.2570187366759027814978047e-28*w.^3+8.2570187366759027814978047e-19*w.^2-8.2570187366759027814978047e-10*w.^1+8.2570187366759027814978047e-01

```
figure;
hold on
title("n_{eff} vs  $\omega/\lambda$ ");
plot(l,neff,'bo',l,wgFundamental.neffwFun(w),'r-.',l,wgFundamental.nefflFun(l),'g--');
legend(["Data","neff( $\omega$ )","neff( $\lambda$ )"]);
xlabel("\lambda");
ylabel("n_{eff}");
hold off
```



Subfunctions (k, dw, Vg, d2w, D)

```
disp("Function k(w):");
```

Function k(w):

```
disp(wgFundamental.kwStr);
```

```
w.*(1.747346577041554230953220300498e-271*w.^30-7.662539294564936012074625087400e-262*w.^29+8.2570187366759027814970e-251*w.^28-7.662539294564936012074625087400e-262*w.^27+8.2570187366759027814970e-251*w.^26-7.662539294564936012074625087400e-262*w.^25+8.2570187366759027814970e-251*w.^24-7.662539294564936012074625087400e-262*w.^23+8.2570187366759027814970e-251*w.^22-7.662539294564936012074625087400e-262*w.^21+8.2570187366759027814970e-251*w.^20-7.662539294564936012074625087400e-262*w.^19+8.2570187366759027814970e-251*w.^18-7.662539294564936012074625087400e-262*w.^17+8.2570187366759027814970e-251*w.^16-7.662539294564936012074625087400e-262*w.^15+8.2570187366759027814970e-251*w.^14-7.662539294564936012074625087400e-262*w.^13+8.2570187366759027814970e-251*w.^12-7.662539294564936012074625087400e-262*w.^11+8.2570187366759027814970e-251*w.^10-7.662539294564936012074625087400e-262*w.^9+8.2570187366759027814970e-251*w.^8-7.662539294564936012074625087400e-262*w.^7+8.2570187366759027814970e-251*w.^6-7.662539294564936012074625087400e-262*w.^5+8.2570187366759027814970e-251*w.^4-7.662539294564936012074625087400e-262*w.^3+8.2570187366759027814970e-251*w.^2-7.662539294564936012074625087400e-262*w.^1+8.2570187366759027814970e-251*w.^0);
```

```
disp("Function dk(w)/dw:");
```

Function dk(w)/dw:

```
disp(wgFundamental.dkdwStr);
```

```
(1.747346577041554230953220300498e-271*w.^30*(31)-7.662539294564936012074625087400e-262*w.^29*(30)+8.2570187366759027814970e-251*w.^28*(28)-7.662539294564936012074625087400e-262*w.^27*(27)+8.2570187366759027814970e-251*w.^26*(26)-7.662539294564936012074625087400e-262*w.^25*(25)+8.2570187366759027814970e-251*w.^24*(24)-7.662539294564936012074625087400e-262*w.^23*(23)+8.2570187366759027814970e-251*w.^22*(22)-7.662539294564936012074625087400e-262*w.^21*(21)+8.2570187366759027814970e-251*w.^20*(20)-7.662539294564936012074625087400e-262*w.^19*(19)+8.2570187366759027814970e-251*w.^18*(18)-7.662539294564936012074625087400e-262*w.^17*(17)+8.2570187366759027814970e-251*w.^16*(16)-7.662539294564936012074625087400e-262*w.^15*(15)+8.2570187366759027814970e-251*w.^14*(14)-7.662539294564936012074625087400e-262*w.^13*(13)+8.2570187366759027814970e-251*w.^12*(12)-7.662539294564936012074625087400e-262*w.^11*(11)+8.2570187366759027814970e-251*w.^10*(10)-7.662539294564936012074625087400e-262*w.^9*(9)+8.2570187366759027814970e-251*w.^8*(8)-7.662539294564936012074625087400e-262*w.^7*(7)+8.2570187366759027814970e-251*w.^6*(6)-7.662539294564936012074625087400e-262*w.^5*(5)+8.2570187366759027814970e-251*w.^4*(4)-7.662539294564936012074625087400e-262*w.^3*(3)+8.2570187366759027814970e-251*w.^2*(2)-7.662539294564936012074625087400e-262*w.^1*(1)+8.2570187366759027814970e-251*w.^0*(0));
```

```
disp("Function Vg(w):");
```

Function Vg(w):

```
disp(wgFundamental.vgwStr);
```

```
(3*10^8)./(1.747346577041554230953220300498e-271*w.^30*(31)-7.662539294564936012074625087400e-262*w.^29*(30)+8.2570187366759027814970e-251*w.^28*(28)-7.662539294564936012074625087400e-262*w.^27*(27)+8.2570187366759027814970e-251*w.^26*(26)-7.662539294564936012074625087400e-262*w.^25*(25)+8.2570187366759027814970e-251*w.^24*(24)-7.662539294564936012074625087400e-262*w.^23*(23)+8.2570187366759027814970e-251*w.^22*(22)-7.662539294564936012074625087400e-262*w.^21*(21)+8.2570187366759027814970e-251*w.^20*(20)-7.662539294564936012074625087400e-262*w.^19*(19)+8.2570187366759027814970e-251*w.^18*(18)-7.662539294564936012074625087400e-262*w.^17*(17)+8.2570187366759027814970e-251*w.^16*(16)-7.662539294564936012074625087400e-262*w.^15*(15)+8.2570187366759027814970e-251*w.^14*(14)-7.662539294564936012074625087400e-262*w.^13*(13)+8.2570187366759027814970e-251*w.^12*(12)-7.662539294564936012074625087400e-262*w.^11*(11)+8.2570187366759027814970e-251*w.^10*(10)-7.662539294564936012074625087400e-262*w.^9*(9)+8.2570187366759027814970e-251*w.^8*(8)-7.662539294564936012074625087400e-262*w.^7*(7)+8.2570187366759027814970e-251*w.^6*(6)-7.662539294564936012074625087400e-262*w.^5*(5)+8.2570187366759027814970e-251*w.^4*(4)-7.662539294564936012074625087400e-262*w.^3*(3)+8.2570187366759027814970e-251*w.^2*(2)-7.662539294564936012074625087400e-262*w.^1*(1)+8.2570187366759027814970e-251*w.^0*(0));
```

```
disp("Function d2k(w)/dw:");
```

Function d2k(w)/dw:

```
disp(wgFundamental.d2kwdw2Str);
```

```
(1.747346577041554230953220300498e-271*w.^29*(930)-7.662539294564936012074625087400e-262*w.^28*(870)+8.257018736675
```

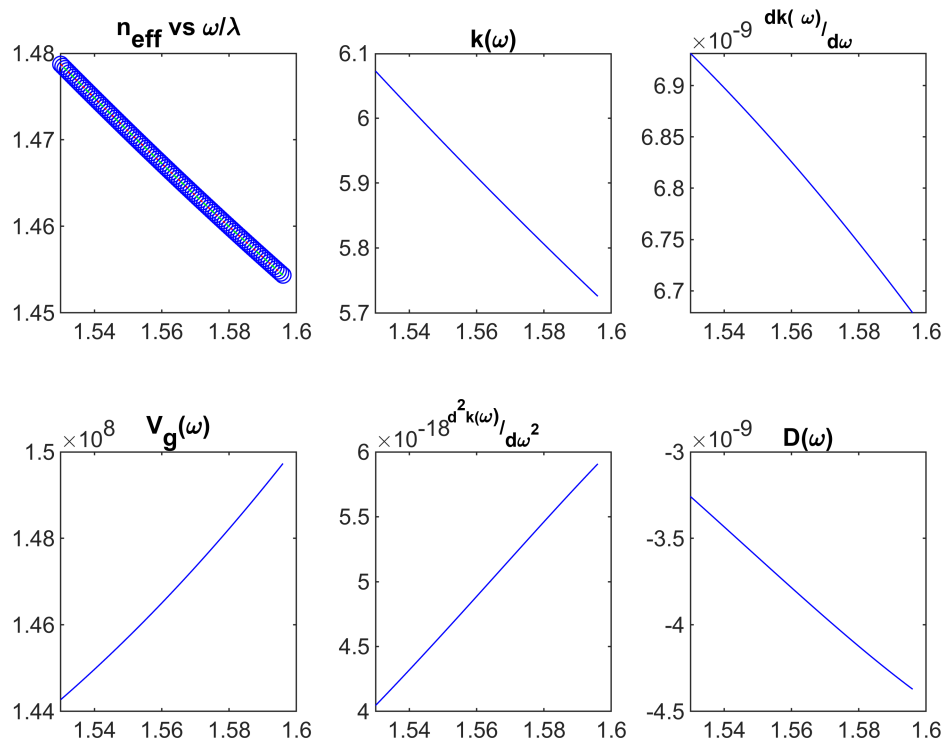
```
disp("Function D(w):");
```

```
Function D(w):
```

```
disp(wgFundamental.DwStr);
```

```
-(w.^2/(2*pi*3*10^8)).*((1.747346577041554230953220300498e-271*w.^29*(930)-7.662539294564936012074625087400e-262*w.
```

```
subplot(2,3,1);  
plot(1,neff,'bo',1,wgFundamental.neffwFun(w),'r-.',1,wgFundamental.nefflFun(1),'g--');  
title("n_{eff} vs \omega/\lambda");  
subplot(2,3,2);  
plot(1,wgFundamental.kwFun(w),'b');  
title("k(\omega)");  
subplot(2,3,3);  
plot(1,wgFundamental.dkwdwFun(w),'b');  
title("^{dk(\omega)}/{d\omega}");  
subplot(2,3,4);  
plot(1,wgFundamental.vgwFun(w),'b');  
title("V_g(\omega)");  
subplot(2,3,5);  
plot(1,wgFundamental.d2kwdw2Fun(w),'b');  
title("^{d^2k(\omega)}/{d\omega^2}");  
subplot(2,3,6);  
plot(1,wgFundamental.DwFun(w),'b');  
title("D(\omega)");
```



Superior Mode Data (530nm):

```
file = sprintf(Superior,sXs(sel),sYs(sel),ModesSup(sel));
load(SuperiorPath+file);
wgSuperior = waveguide(lambda,neff);
l = wgSuperior.lambdaData;
w = wgSuperior.omegaData;
neff = wgSuperior.neffData;
```

Ranges:

```
disp("Lambda Ranges: "+num2str(min(l))+"-"+num2str(max(l))+"");
```

Lambda Ranges: 0.51-0.532

```
disp("Omega Ranges: "+num2str(min(w))+"-"+num2str(max(w))+"");
```

Omega Ranges: 3543149609.3118-3695991357.1645

Neff vs ω/λ

```
disp("Function neff(lambda):");
```

Function neff(λ):

```
disp(wgSuperior.nefflStr);
```

-5742622197979.33789062500000000000000000000000*1.^30+17180000718023.59570312500000000000000000000000*1.^29-19817629871...

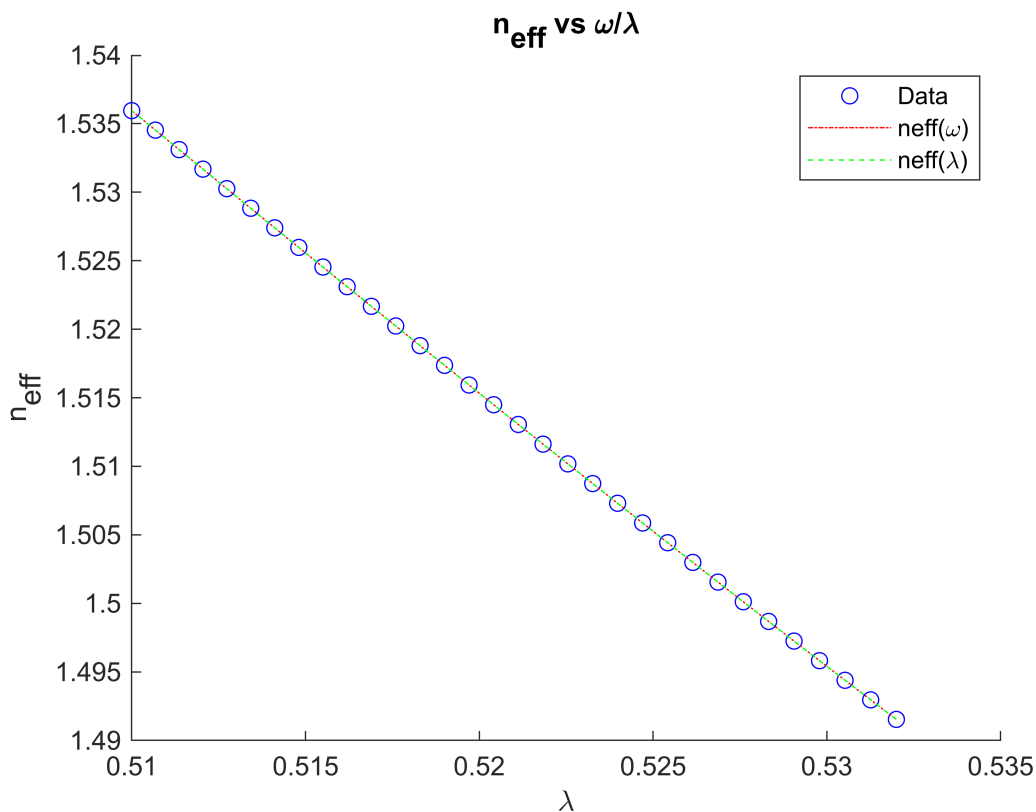
```
disp("Function neff(w):");
```

```
Function neff(w):
```

```
disp(wgSuperior.neffwStr);
```

```
8.372027009427822824801653302857e-283*w.^30-8.775337957019159296477410024564e-273*w.^29+2.7332871505694742104750348
```

```
figure;  
hold on  
title("n_{eff} vs \omega/\lambda");  
plot(l,neff,'bo',l,wgSuperior.neffwFun(w),'r-.',l,wgSuperior.nefflFun(l),'g--');  
legend(["Data","neff(\omega)","neff(\lambda)"]);  
xlabel("\lambda");  
ylabel("n_{eff}");  
hold off
```



Subfunctions (k, dw, Vg, d2w, D)

```
disp("Function k(w):");
```

```
Function k(w):
```

```
disp(wgSuperior.kwStr);
```

```
w.*(8.372027009427822824801653302857e-283*w.^30-8.775337957019159296477410024564e-273*w.^29+2.7332871505694742104750348
```

```
disp("Function dk(w)/dw:");
```

Function dk(w)/dw:

```
disp(wgSuperior.dkwdwStr);
```

```
(8.372027009427822824801653302857e-283*w.^30*(31)-8.775337957019159296477410024564e-273*w.^29*(30)+2.73328715056947e-263*w.^28*(29)-2.73328715056947e-263*w.^27*(28)+2.73328715056947e-263*w.^26*(27)-2.73328715056947e-263*w.^25*(26)+2.73328715056947e-263*w.^24*(25)-2.73328715056947e-263*w.^23*(24)+2.73328715056947e-263*w.^22*(23)-2.73328715056947e-263*w.^21*(22)+2.73328715056947e-263*w.^20*(21)-2.73328715056947e-263*w.^19*(20)+2.73328715056947e-263*w.^18*(19)-2.73328715056947e-263*w.^17*(18)+2.73328715056947e-263*w.^16*(17)-2.73328715056947e-263*w.^15*(16)+2.73328715056947e-263*w.^14*(15)-2.73328715056947e-263*w.^13*(14)+2.73328715056947e-263*w.^12*(13)-2.73328715056947e-263*w.^11*(12)+2.73328715056947e-263*w.^10*(11)-2.73328715056947e-263*w.^9*(10)+2.73328715056947e-263*w.^8*(9)-2.73328715056947e-263*w.^7*(8)+2.73328715056947e-263*w.^6*(7)-2.73328715056947e-263*w.^5*(6)+2.73328715056947e-263*w.^4*(5)-2.73328715056947e-263*w.^3*(4)+2.73328715056947e-263*w.^2*(3)-2.73328715056947e-263*w.^1*(2)+2.73328715056947e-263*w.^0*(1))
```

```
disp("Function Vg(w):");
```

Function Vg(w):

```
disp(wgSuperior.vgwStr);
```

```
(3*10^8)./(8.372027009427822824801653302857e-283*w.^30*(31)-8.775337957019159296477410024564e-273*w.^29*(30)+2.73328715056947e-263*w.^28*(29)-2.73328715056947e-263*w.^27*(28)+2.73328715056947e-263*w.^26*(27)-2.73328715056947e-263*w.^25*(26)+2.73328715056947e-263*w.^24*(25)-2.73328715056947e-263*w.^23*(24)+2.73328715056947e-263*w.^22*(23)-2.73328715056947e-263*w.^21*(22)+2.73328715056947e-263*w.^20*(21)-2.73328715056947e-263*w.^19*(20)+2.73328715056947e-263*w.^18*(19)-2.73328715056947e-263*w.^17*(18)+2.73328715056947e-263*w.^16*(17)-2.73328715056947e-263*w.^15*(16)+2.73328715056947e-263*w.^14*(15)-2.73328715056947e-263*w.^13*(14)+2.73328715056947e-263*w.^12*(13)-2.73328715056947e-263*w.^11*(12)+2.73328715056947e-263*w.^10*(11)-2.73328715056947e-263*w.^9*(10)+2.73328715056947e-263*w.^8*(9)-2.73328715056947e-263*w.^7*(8)+2.73328715056947e-263*w.^6*(7)-2.73328715056947e-263*w.^5*(6)+2.73328715056947e-263*w.^4*(5)-2.73328715056947e-263*w.^3*(4)+2.73328715056947e-263*w.^2*(3)-2.73328715056947e-263*w.^1*(2)+2.73328715056947e-263*w.^0*(1))
```

```
disp("Function d2k(w)/dw2:");
```

Function d2k(w)/dw2:

```
disp(wgSuperior.d2kwdw2Str);
```

```
(8.372027009427822824801653302857e-283*w.^29*(930)-8.775337957019159296477410024564e-273*w.^28*(870)+2.73328715056947e-263*w.^27*(810)-2.73328715056947e-263*w.^26*(750)+2.73328715056947e-263*w.^25*(690)-2.73328715056947e-263*w.^24*(630)+2.73328715056947e-263*w.^23*(570)-2.73328715056947e-263*w.^22*(510)+2.73328715056947e-263*w.^21*(450)+2.73328715056947e-263*w.^20*(390)-2.73328715056947e-263*w.^19*(330)+2.73328715056947e-263*w.^18*(270)+2.73328715056947e-263*w.^17*(210)+2.73328715056947e-263*w.^16*(150)+2.73328715056947e-263*w.^15*(90)+2.73328715056947e-263*w.^14*(30)+2.73328715056947e-263*w.^13*(0)+2.73328715056947e-263*w.^12*(0)+2.73328715056947e-263*w.^11*(0)+2.73328715056947e-263*w.^10*(0)+2.73328715056947e-263*w.^9*(0)+2.73328715056947e-263*w.^8*(0)+2.73328715056947e-263*w.^7*(0)+2.73328715056947e-263*w.^6*(0)+2.73328715056947e-263*w.^5*(0)+2.73328715056947e-263*w.^4*(0)+2.73328715056947e-263*w.^3*(0)+2.73328715056947e-263*w.^2*(0)+2.73328715056947e-263*w.^1*(0)+2.73328715056947e-263*w.^0*(0))
```

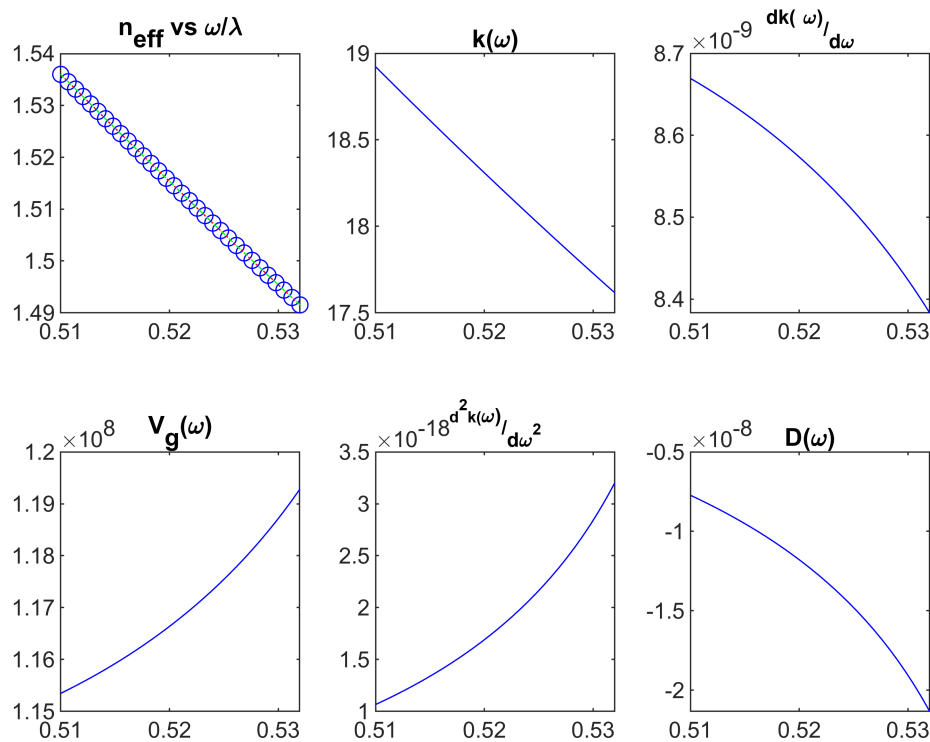
```
disp("Function D(w):");
```

Function D(w):

```
disp(wgSuperior.DwStr);
```

```
-(w.^2/(2*pi*3*10^8)).*((8.372027009427822824801653302857e-283*w.^29*(930)-8.775337957019159296477410024564e-273*w.^28*(870)+2.73328715056947e-263*w.^27*(810)-2.73328715056947e-263*w.^26*(750)+2.73328715056947e-263*w.^25*(690)-2.73328715056947e-263*w.^24*(630)+2.73328715056947e-263*w.^23*(570)-2.73328715056947e-263*w.^22*(510)+2.73328715056947e-263*w.^21*(450)+2.73328715056947e-263*w.^20*(390)-2.73328715056947e-263*w.^19*(330)+2.73328715056947e-263*w.^18*(270)+2.73328715056947e-263*w.^17*(210)+2.73328715056947e-263*w.^16*(150)+2.73328715056947e-263*w.^15*(90)+2.73328715056947e-263*w.^14*(30)+2.73328715056947e-263*w.^13*(0)+2.73328715056947e-263*w.^12*(0)+2.73328715056947e-263*w.^11*(0)+2.73328715056947e-263*w.^10*(0)+2.73328715056947e-263*w.^9*(0)+2.73328715056947e-263*w.^8*(0)+2.73328715056947e-263*w.^7*(0)+2.73328715056947e-263*w.^6*(0)+2.73328715056947e-263*w.^5*(0)+2.73328715056947e-263*w.^4*(0)+2.73328715056947e-263*w.^3*(0)+2.73328715056947e-263*w.^2*(0)+2.73328715056947e-263*w.^1*(0)+2.73328715056947e-263*w.^0*(0))
```

```
subplot(2,3,1);  
plot(1,neff,'bo',1,wgSuperior.neffwFun(w),'r-.',1,wgSuperior.nefflFun(1),'g--');  
title("n_{eff} vs \omega/\lambda");  
subplot(2,3,2);  
plot(1,wgSuperior.kwFun(w),'b');  
title("k(\omega)");  
subplot(2,3,3);  
plot(1,wgSuperior.dkwdwFun(w),'b');  
title("^{dk(\omega)}/{d\omega}");  
subplot(2,3,4);  
plot(1,wgSuperior.vgwFun(w),'b');  
title("V_g(\omega)");  
subplot(2,3,5);  
plot(1,wgSuperior.d2kwdw2Fun(w),'b');  
title("^{d^2k(\omega)}/{d\omega^2}");  
subplot(2,3,6);  
plot(1,wgSuperior.DwFun(w),'b');  
title("D(\omega)");
```



Load Waveguide Simple:

```
file = sprintf(Fundamental,sXs(sel)*1000,sYs(sel)*1000);
load(FundamentalPath+file);
wgFundamental = waveguide(lambda,neff);
file = sprintf(Superior,sXs(sel),sYs(sel),mode);
load(SuperiorPath+file);
wgSuperior = waveguide(lambda,neff);
```

K's comparing

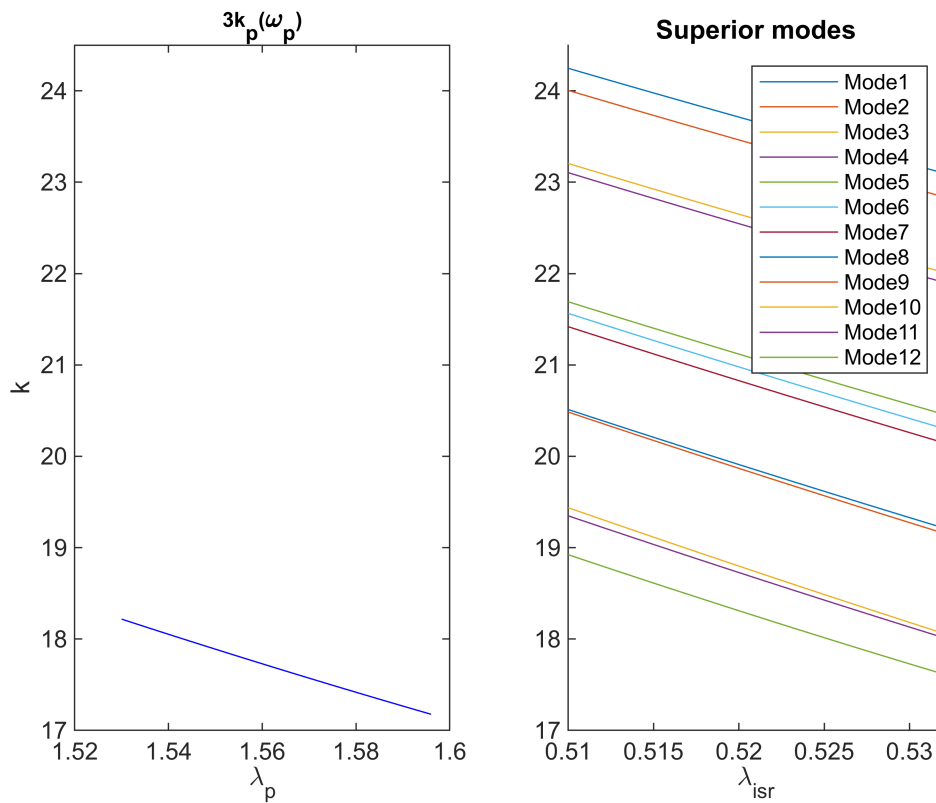
```
file = sprintf(Fundamental,sXs(sel)*1000,sYs(sel)*1000);
load(FundamentalPath+file);
wgFundamental = waveguide(lambda,neff);
l = wgFundamental.lambdaData;
w = wgFundamental.omegaData;
neff = wgFundamental.neffData;
figure;
subplot(1,2,1)
plot(l,wgFundamental.kwFun(w).*3,'b');
leg = {};
title("3k_p(\omega_p)"); xlabel("\lambda_p"); ylabel("k");
```



```

ylim([17 24.5]);
subplot(1,2,2)
hold on
for i = 1:nmodes
    file = sprintf(Superior,sXs(sel),sYs(sel),i);
    load(SuperiorPath+file);
    wgSuperior = waveguide(lambda,neff);
    l = wgSuperior.lambdaData;
    w = wgSuperior.omegaData;
    plot(l,wgSuperior.kwFun(w));
    leg(end+1) = {"Mode"+num2str(i)};
end
legend(leg);
ylim([17 24.5]);
title("Superior modes"); xlabel("\lambda_{isr}");
hold off

```



Find degenerate photon that allow momentum and energy conservation

```

size=50;

lpLim = [min(wgFundamental.lambdaData) max(wgFundamental.lambdaData)];
lpLim = [min(wgSuperior.lambdaData) max(wgSuperior.lambdaData)];
lp = linspace(lpLim(1),lpLim(2),size);

```

```

wp = 2.*pi.*3.*10.^8./lp;
ws = wp./3;
leg = {};

file = sprintf(Fundamental,sXs(sel)*1000,sYs(sel)*1000);
load(FundamentalPath+file);
wgFundamental = waveguide(lambda,neff);

figure
hold on

dk0s = [];

for i = 1:nmodes
    file = sprintf(Superior,sXs(sel),sYs(sel),i);
    load(SuperiorPath+file);
    wgSuperior = waveguide(lambda,neff);
    %Nota w 10^8 es 10^14

    dk = wgSuperior.kwFun(wp)-(3*wgFundamental.kwFun(ws));

    if(min(dk)<=0 && max(dk)>=0)
        dk0s = [dk0s i];
    end

    plot(lp,dk);
    leg(end+1) = {"Mode"+num2str(i)};
end

if ~isequal(dk0s,[])
    strDk0s = sprintf('Modo %i,',dk0s);
    strDk0s = "Modos con dK=0: "+strDk0s(1:end-1);
else
    strDk0s = "Ningun modo con dK=0";
end

disp(strDk0s)

```

Ningun modo con dK=0

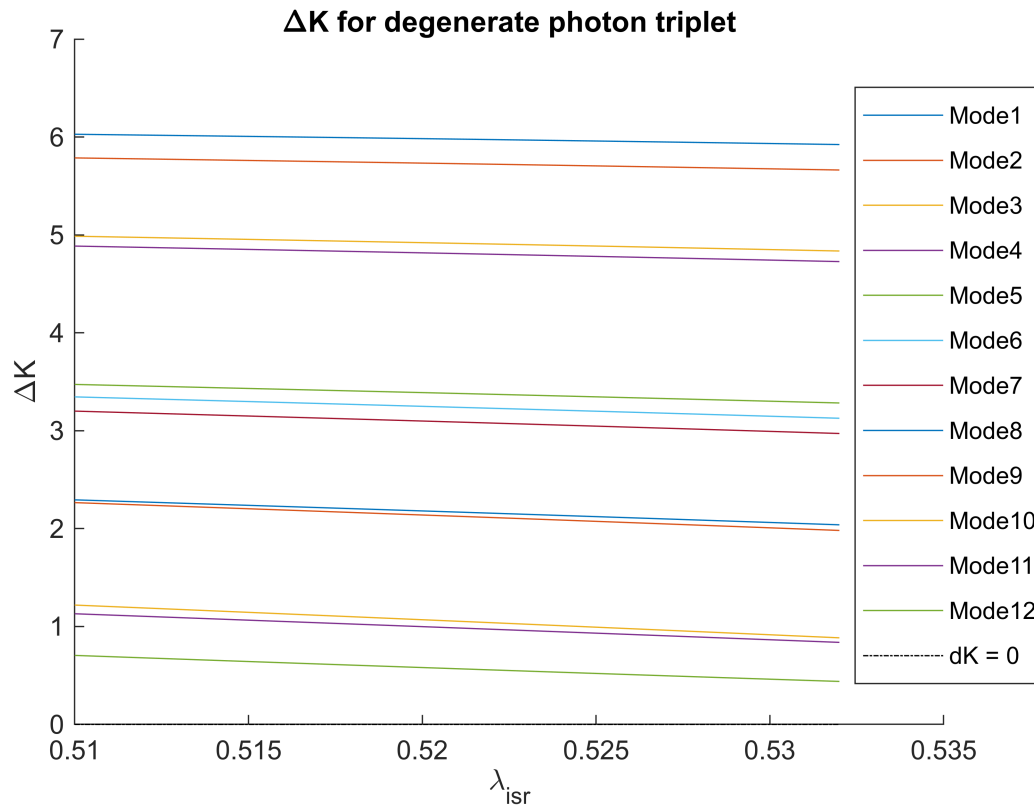
```

plot([lpLim(1),lpLim(2)],[0,0],'k-.')
leg(end+1) = {"dK = 0"};

legend(leg);
title("\DeltaK for degenerate photon triplet");
ylabel("\DeltaK"); xlabel("\lambda_{isr}");

legend("Position", [0.8256,0.15841,0.16964,0.70952])

```



Phase Matching

```

switch nmodes
case 15
    m = 5;n = 3;
case 9
    m = 3;n = 3;
case 19
    m = 5;n = 4;
case 12
    m = 4;n = 3;
end

file = sprintf(Fundamental,sXs(sel)*1000,sYs(sel)*1000);
load(FundamentalPath+file);
wgFundamental = waveguide(lambda,neff);

lpLim = [min(wgFundamental.lambdaData) max(wgFundamental.lambdaData)];
lpLim = [min(wgSuperior.lambdaData) max(wgSuperior.lambdaData)];
li = 1.53;
size=50;

wp = linspace(2.*pi.*3.*10.^8./lpLim(1),2.*pi.*3.*10.^8./lpLim(2),size);
dw = linspace(1e8,-1e8,size);

```

```
[WP,DW] = meshgrid(wp,dw);
wi = (2.*pi.*3.*10.^8./li);
wr = DW+(WP-wi)/2;
ws = WP-wi-wr;
```

```
disp("Pump wavelength: "+num2str(lpLim(1))+ "-" + num2str(lpLim(2)));
```

Pump wavelength: 0.51-0.532

```
disp("Photon wavelength: "+num2str(lphLim(1))+ "-" + num2str(lphLim(2)));
```

Photon wavelength: 1.53-1.596

```
figure
for i = 1:nmodes
    file = sprintf(Superior,sXs(sel),sYs(sel),i);
    load(SuperiorPath+file);
    wgSuperior = waveguide(lambda,neff);
    %Nota w 10^8 es 10^14
    DK = wgSuperior.kwFun(WP)-(wgFundamental.kwFun(wi)+wgFundamental.kwFun(wr)+wgFundamental.kwFun(ws));
    subplot(m,n,i)
    contour(2.*pi.*3.*10.^8./wp,dw.*10^6,DK,[0 0], 'b', 'LineWidth',2);
    title("M "+num2str(i));
    ylabel("\omega");
end
sgtitle("Waveguide "+num2str(sXs(sel))+ "x" + num2str(sYs(sel))+ " with \lambda_i = "+num2str(li))
```

Waveguide 405x730 with $\lambda_i = 1.53$

