Fabry-Perot Etalon1 (wavelength,angle)

In[2498]:=

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ClearAll["Global`*"]
SetDirectory[NotebookDirectory[]];

c = 3 × 10^8;(*m/s*)
n = 1;(*air gap etalon*)
d = 0.0103 * 10^-3;(*m, effective thickness*)
(*λ=800 10^-9;*) (*m*)
(*θ=ang in degree*)
R = 0.965;(*dd*)
fsr = c/(2 n d);(*Hz*)
fwhm = c (1 - R)/(2 π n d √R);(*Hz*)
F = π √R/(1 - R);
Print["frs = ", fsr, "(Hz), fwhm = ", fwhm, ", Finesse = ", F]

δ[λ_, θ_] := 2 π/λ n d Cos[θ π/180];
T[λ_, θ_] := 1/(1 + 4 R/(1-R)^2 Sin[δ[λ, θ] / 2]^2);
λ1 = 800 × 10^-9 ;(*m*)
p1 = Plot[T[λ1, θ], {θ, 0, 90}, PlotRange → {{10, 80}, {0, 1.1}},
    PlotLegends → Placed[{"λ= 800nm"}, {0.15, 0.95}], Frame → True,
    FrameLabel → {"Angle (deg)", "Transmission"}, ImageSize → Medium,
    LabelStyle → {FontFamily → "Arial", FontSize → 12, Black},
    FrameTicks → {{Automatic, None}, {Table[λ, {λ, 10, 80, 10}], None}}];

ang = 45.68;(*deg*)
p2 = Plot[T[λ, ang], {λ, 700 × 10^-9, 900 × 10^-9},
    PlotRange → {{700 × 10^-9, 900 × 10^-9}, {0, 1.1}},
    PlotLegends → Placed[{"ang=45.68°"}, {0.15, 0.95}], Frame → True,
    FrameLabel → {"Wavelength (nm)", "Transmission"}, ImageSize → Medium,
    LabelStyle → {FontFamily → "Arial", FontSize → 12, Black}, FrameTicks →
     {{Automatic, None}, {Table[{λ * 10^-9, λ}, {λ, 700, 900, 50}], None}}];

ang = 42 ;(*deg*)
p3 = Plot[T[λ, ang], {λ, 700 × 10^-9, 900 × 10^-9},
    PlotRange → {{700 × 10^-9, 900 × 10^-9}, {0, 1.1}},
    PlotLegends → Placed[{"ang=42°"}, {0.15, 0.95}], Frame → True,
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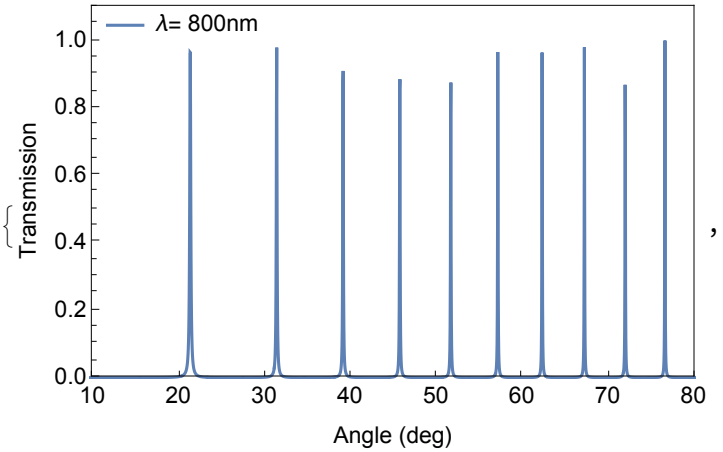
    FrameLabel → {"Wavelength (nm)", "Transmission"}, ImageSize → Medium,
    LabelStyle → {FontFamily → "Arial", FontSize → 12, Black}, FrameTicks →
     {{Automatic, None}, {Table[{λ * 10^-9, λ}, {λ, 700, 900, 50}], None}}];

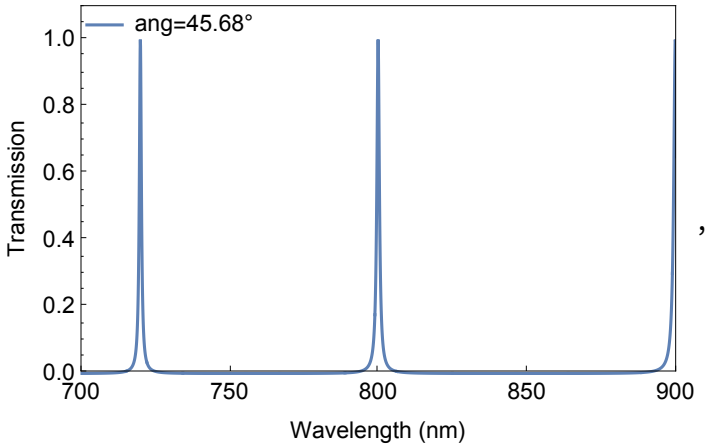
{p1, p2, p3}

p4 = Plot3D[T[λ, θ], {λ, 700 × 10^-9, 900 × 10^-9}, {θ, 10, 80},
  PlotRange → All, PlotLegends → Placed[{"T(λ,θ)"}, {0.1, 0.85}],
  ImageSize → Large, LabelStyle → {FontFamily → "Arial", FontSize → 12, Black},
  LabelStyle → {FontFamily → "Arial", FontSize → 12, Black},
  AxesLabel → {"Wavelength (nm)", "Angle (°)", "Transmission"}]
frs = 1.45631 × 10^13 (Hz), fwhm = 1.65161 × 10^11, Finesse = 88.175
```

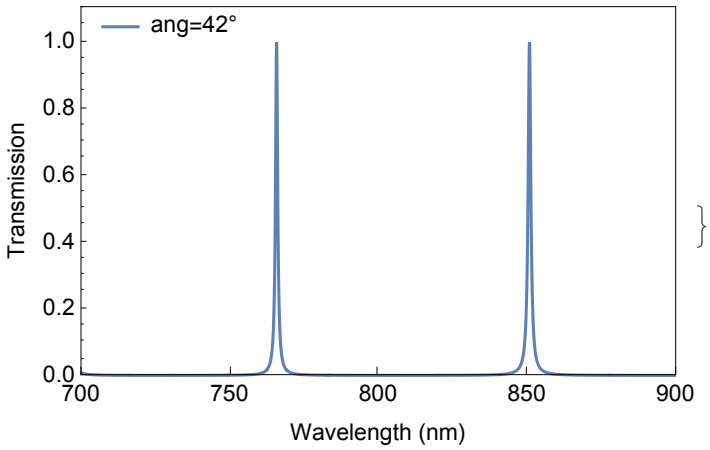
Out[2516]=


λ= 800nm
Transmission
Angle (deg)
1.0
0.8
0.6
0.4
0.2
0.0
10
20
30
40
50
60
70
80

,

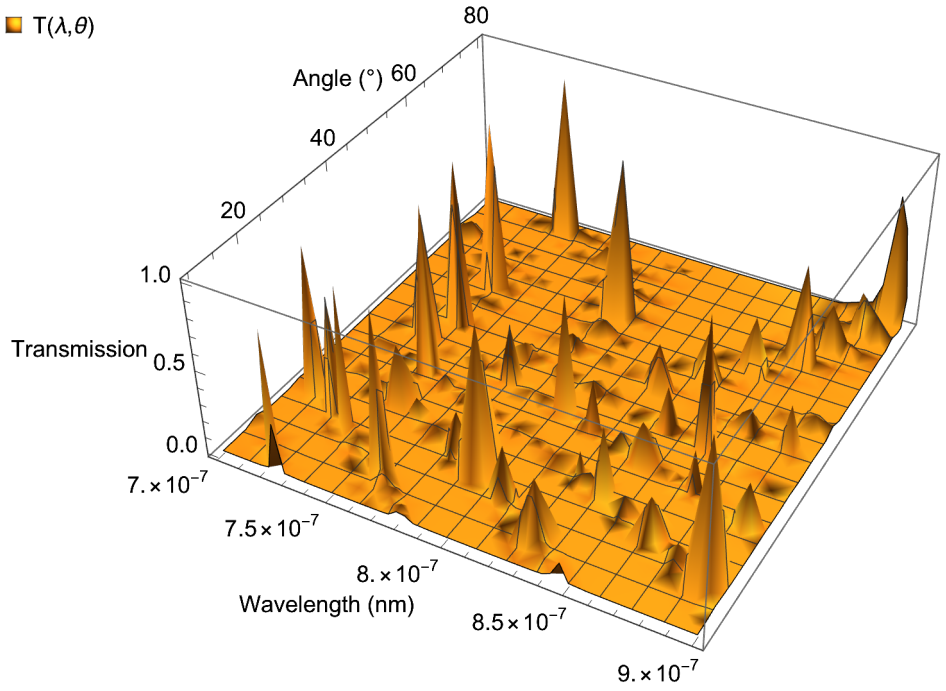

ang=45.68°
Transmission
Wavelength (nm)
1.0
0.8
0.6
0.4
0.2
0.0
700
750
800
850
900

,


ang=42°
Transmission
Wavelength (nm)
1.0
0.8
0.6
0.4
0.2
0.0
700
750
800
850
900

}

Out[2517]=



In[2556]:=
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ang = 45.68; (*deg*)
ClearAll[R];
T[λ_, θ_] := 1 / (1 + 4 R / (1-R)^2 Sin[δ[λ, θ] / 2]^2);
Plot[{T[λ, ang] /. R → {0.7}, T[λ, ang] /. R → {0.8}, T[λ, ang] /. R → {0.9}},
 {λ, 700 × 10^-9, 900 × 10^-9}, PlotRange → {{700 × 10^-9, 900 × 10^-9}, {0, 1.1}},
 PlotLegends → Placed[{"R=0.7", "R=0.8", "R=0.9"}, {0.3, 0.7}],
 Frame → True, FrameLabel → {"Wavelength (nm)", "Transmission"},
 ImageSize → Medium, LabelStyle → {FontFamily → "Arial", FontSize → 12, Black},
 FrameTicks → {{Automatic, None}, {Table[{λ * 10^-9, λ}, {λ, 700, 900, 50}], None}}]
```

Out[2559]=