Planar Waveguides

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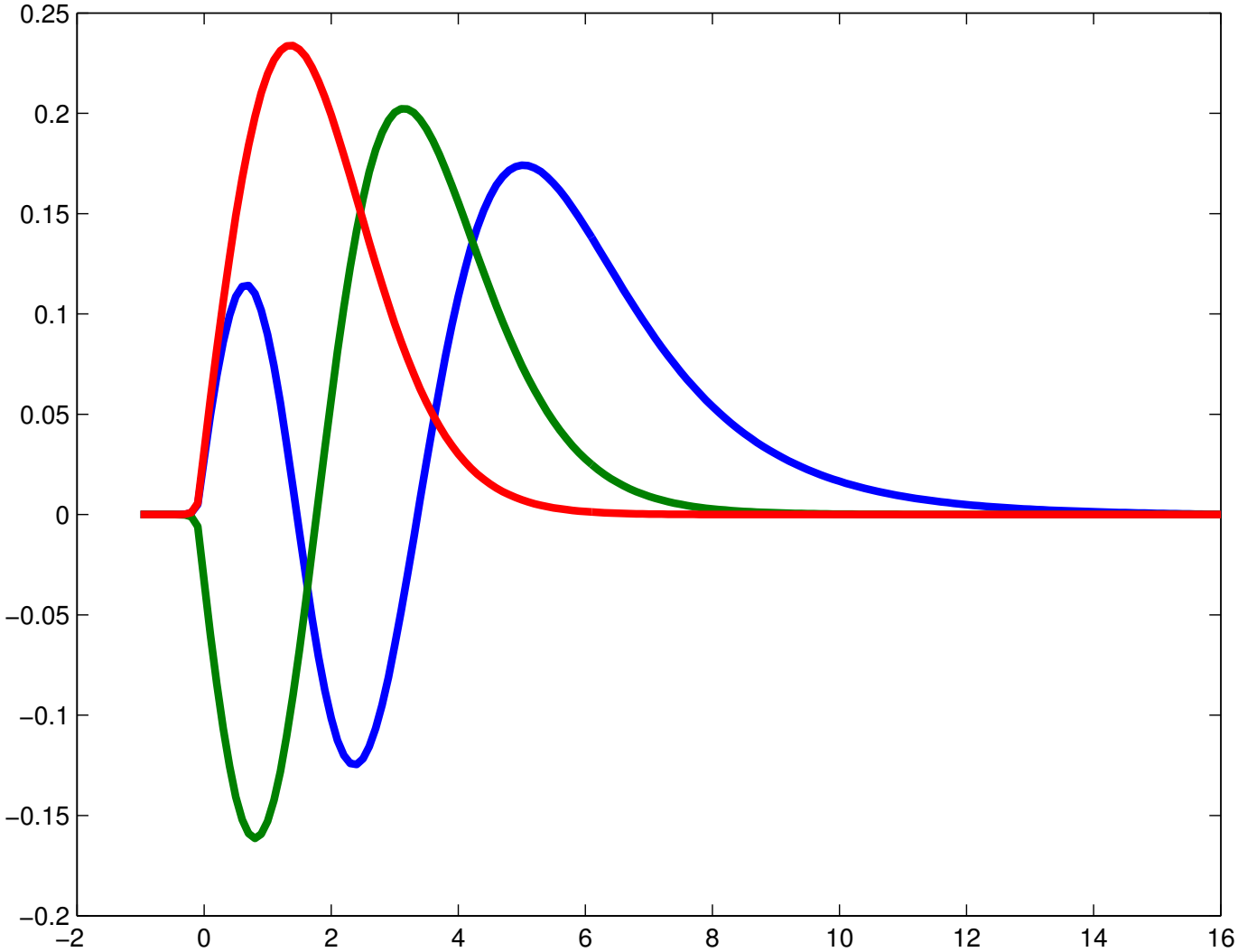
- gaussian diffusion profile

```
1   LAMBDA=0.6328;
2   k0=2*pi/LAMBDA;
3   EC=1.000;
4   ES=4.800;
5   ED=0.045;
6   W=4.00;
7   xmin=-1.0;
8   xmax=4*W;
9   h=0.1;
10  x=(xmin:h:xmax)';
11  dim=size(x,1);
12  prm=(x<0).*EC+(x>=0).*(ES+ED*exp(-(x/W).^2));
13  next=ones(dim-1,1)/h^2/k0^2;
14  main=-2.0*ones(dim,1)/h^2/k0^2+prm;
15  L=diag(next,-1)+diag(main,0)+diag(next,1);
16  [evec, eval]=eig(L);
17  eff_eps=diag(eval);
18  guided=evec(:,eff_eps>ES);
19  plot(x,guided);
```



The guided modes of a graded index waveguide.

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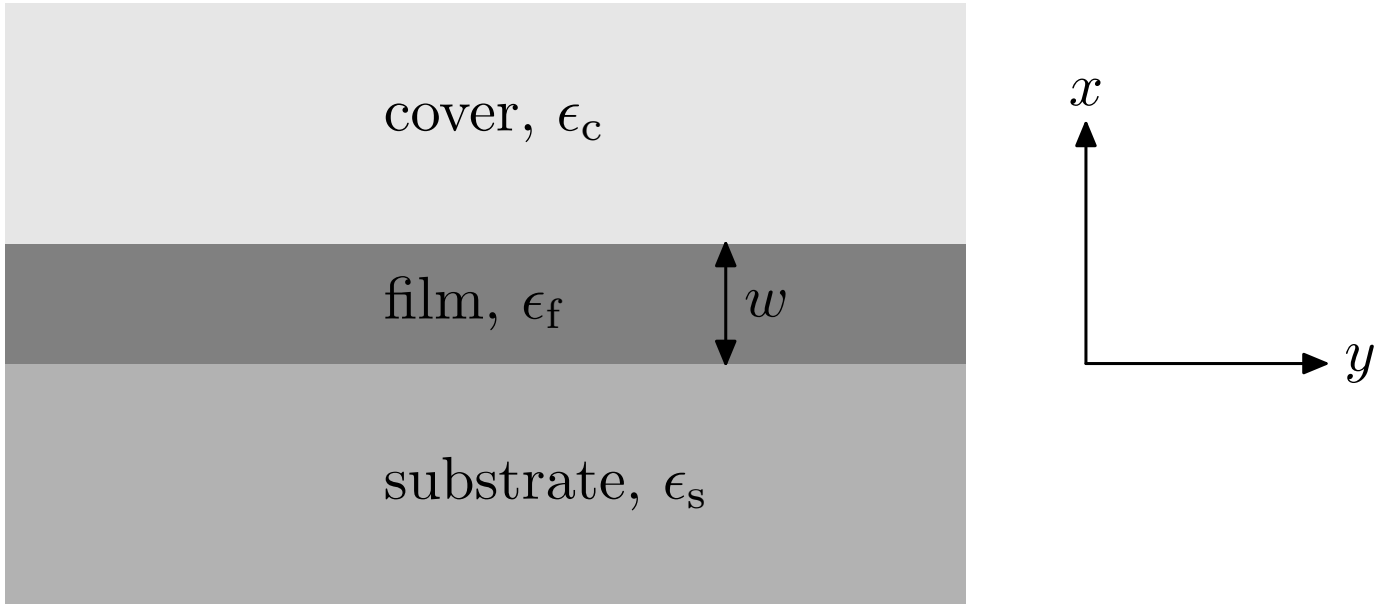
$$\epsilon(x) = \begin{cases} \epsilon_{\mathrm{s}} \text{ for } x < 0 \\ \epsilon_{\mathrm{f}} \text{ for } 0 < x < w \\ \epsilon_{\mathrm{c}} \text{ for } w < x \end{cases}$$



A slab waveguide. A film of increased permittivity on top of a substrate being covered by material of low permittivity. w is the film thickness.

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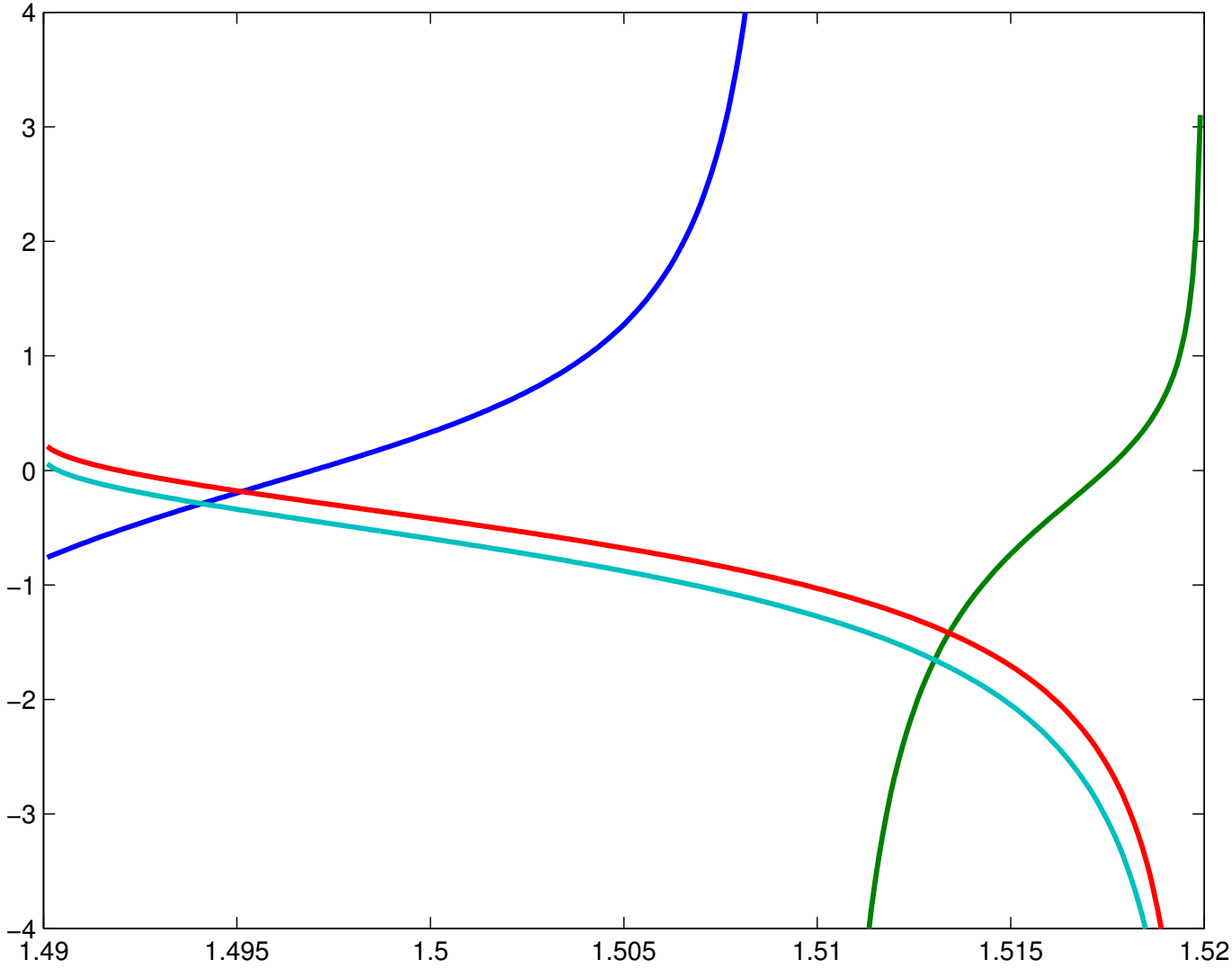
- example: n_f=1.52, w_f=1.8 μm, n_s=1.49, n_c=1.00, λ=632.8 nm.



Graphical solution for TE and TM mode conditions. Blue and green are the branches of the cotangent if plotted versus the effective index. Red and teal represent the right hand sides for TE and TM modes, respectively.

Java applet

`http://wwwhome.math.utwente.nl/~hammerm/oms.html`

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