

OS7201 Electromagnetic Analysis Using FDTD Method

Homework #1 Due: 10/18/2022 at 2 p.m.

(100%) Implement the basic one-dimensional (1D) FDTD update equations in free space for the $H_{|2K\{}$ mode (or wave). The 1D axis is the y -axis in the Cartesian coordinate system. The operating wavelength is 632 nm. The length of the problem space is $1.5\ \mu\text{m}$. To practice implementing the grid resolution into the code, a dummy dielectric slab ($\epsilon_r = 1.0$ and $\mu_r = 1.0$) of 250 nm in thickness is assumed to exist in 1D free space (such that no actual structure exists within the simulation region).

The time step can be set according to $\Delta t = n_{bc}\Delta z/(2c_0)$, where n_{bc} is the refractive index at the boundary and c_0 represents the free-space light speed. Set the number of iterations to 2000. Note that since no source has been implemented, the fields should remain zero during the iteration of time steps.

Please upload your MATLAB m-file to the Homework #1 folder on the course website.

Hint:

To update the graphics at each time step, use 'drawnow' (on empossible.net) after your plot commands inside the main FDTD loop.