

OS7201 Electromagnetic Analysis Using FDTD Method

Homework #7 Due: 12/13/2022 at 2 p.m.

1. (100%) Develop a 2D FDTD code with PML boundary conditions in the x and y directions. Assume the pulse is propagating in free space. The highest frequency component of the pulse and the critical dimension of a *dummy* structure are assumed to be 193.41448 THz and 1000 nm, respectively. The problem space (computational region) should be properly set so as to visualize the pulse propagation and absorption in the PML regions.

The snapshot of the E_z field is shown on p. 6 in Prof. Rumpf's Lecture 15 "Implementation of 2D FDTD". Some hints are provided below:

- a. Keep the $+y$ direction pointing downward because in the 2D simulation it is customary to set the incident wave to be propagating from top to bottom. So while x -high is still at the right edge of the 2D grid, y -high is at the bottom of the grid.
- b. The cells in one direction include those covering the problem space and those of the PML. Set at 20 cells for the PML.

Starting from Homework #5, an additional one-week extension is given with 0% of your scores taken off, if you need more time to complete the homework. Therefore, the last date to turn in Homework #7 is 12/20/2022.