Physics 640
October 16, 2008

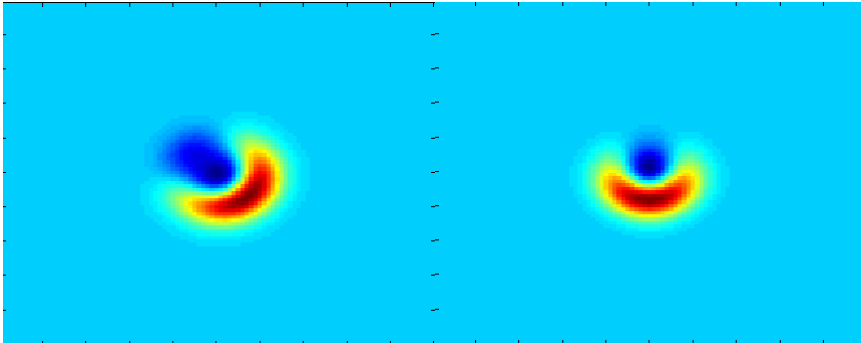Project 3 options (all with animations)

   1) Direct extension of FDTD 1D to 2D, surface waves, with ABC (Team 1)
How many time instants we will need to initialize? 2, 4, 6?
Please discuss this in your report

2D versus 1D: stability requires dt<= δ/c/sqrt(2) versus dt<= δ/c in 1D; this requires
initialization at k=2 at ibar+1/sqrt(2). This makes the ABC more involved than in 1D.

   2) FDTD1D for EM waves with ABC and implement a least two media, should see
       reflection and transmission (FDTD can handle any number of media we may
       have) (Team 3)

From higher index to lower index, artificial bump before the interface is due to the
different numerical speed in that medium
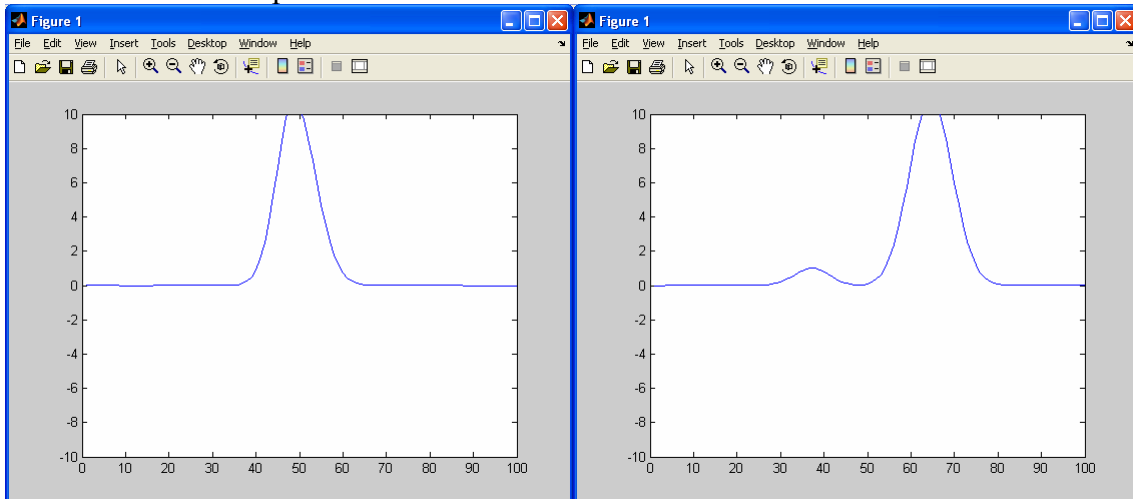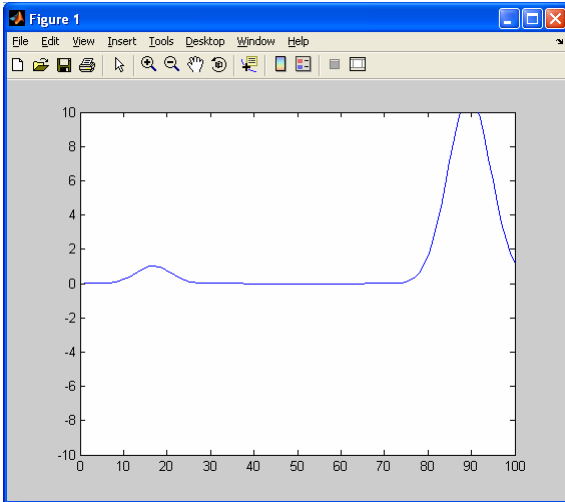
3) Use existing FDTD2D with Mur ABC but implement a correct mode for waveguide coupling. You can implement two parallel waveguides into the FDTD code, then feed in a correct mode (Team 2).
   As expected.

Week 7 & 8:
-Introduction to Molecular Dynamics/Metropolis Algorithm/Monte Carlo

Project 4: this project consists of two parts

a) Molecular interactions, execute the Example Program MolDyn for several particles with different initial conditions, is there low or high sensitivity on these conditions? Use output files to visualize animations of particle motions using Matlab. Include some conclusion on final outcome based on initial conditions.

What is an example of the visualization for this code?
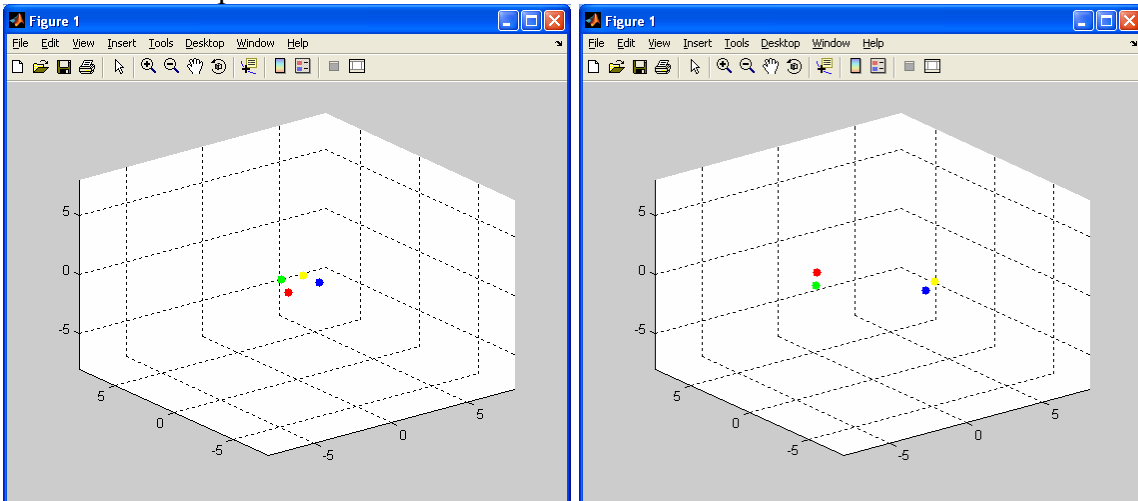
b) Execute an example program based on the Metropolis algorithm, varying one or two parameters, present results using Matlab

Bibliography:

Error! Bookmark not defined..-F. Ercolessi, A Molecular Dynamics Primer, http://www.fisica.uniud.it/~ercolessi/

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