

Project: This project is to demonstrate the Iterated Crank-Nicolson method in a simple setting. The base version of this is restricted to semi-vectorial case. Optionally, students are encouraged to implement the full-vector version of the method.

The task:

- Implement the Iterated Crank-Nicolson (ICN) method for two-dimensional (transverse) domain with PEC boundary conditions. The propagator should include both E_x and E_y polarization components, but the longitudinal vector component of the electric field need not be simulated. Follow the equations derived in the paper [JOSA A 26(2009)2183].
- The program should have the capability to simulate beam propagation in both real and imaginary distance.
- Illustrate the program function on an example involving a simple ridge waveguide, and calculate its quasi-TE and quasi-TM fundamental modes by propagation in imaginary distance. You may compare your calculations with the simulation in the paper J. Lightwave Technology 16 (1998) 248.

Potentially useful sources:

Exercise package for Iterated Crank-Nicolson