

ABSTRACT

In the process of simulating the propagation of waves there are problems when the wave reaches the boundary of the field used in the simulation. In fact, the wave propagates in the $-\infty$ to ∞ field, but until now computer technology has not been able to simulate this phenomenon with the $-\infty$ to ∞ field. The boundary problem has been partially researched in the literature. Research about these approaches resulted in several methods, among others : Perfect Electric Conductor (PEC), Perfect Magnetic Conductor (PMC) and Perfectly Matched Layer (PML). But so far, the comparison of the three boundary conditions are not yet explored in detail. In this research, three boundary condition methods will be implemented on the Finite Difference Time Domain (FDTD) one-dimensional. The three boundary condition methods are tested on three types of excitation signal : impulse, sinusoidal and square. Each experiment was conducted with five variations of the grid. Then each wave simulation results are compared with a reference wave and calculated of the max MSE. The final results of this research indicate that for the FDTD simulation, the grid should be used is at least 80 so that the MSE obtained under 0.04. In the total performance, the PML boundary condition method has the best performance compared to the PMC and PEC boundary condition method with impulse signal as the best of excitation signal then sinusoidal and the last is square.

Key Words : FDTD, PEC, PMC, PML, MSE