

# The Basics of The Finite Difference Time Domain Technique for Electromagnetic Applications

A One Day Short Course  
by

**Atef Z. Elsherbeni and Allen W. Glisson**  
✓ [atef@olemiss.edu](mailto:atef@olemiss.edu) , [aglisson@olemiss.edu](mailto:aglisson@olemiss.edu)

The Electrical Engineering Department  
The University of Mississippi  
University, MS 38677

This short course will provide an overview of the finite difference time domain technique (FDTD) as applied to the design and analysis of antennas and microwave devices. The first half of the course will be dedicated to the basic theories for developing a working algorithm. Among the topics to be covered are: Maxwell's equations in Cartesian coordinates, difference approximations, Yee algorithm, total and scattered field formulations, numerical stability, numerical dispersion, plane wave representation, types of sources, types of waveforms, absorbing boundary conditions, thin wire approximation, near to far field transformation, and modeling of lumped elements. The second half of the course will be dedicated to presenting examples of how to apply the FDTD technique for analyzing antennas, crosstalk in digital circuits, and biological effects of handheld communication antennas. The attendee will receive 1D and 2D working codes with a graphical user interface developed for Windows operating systems.