PathWave EM Design (EMPro)
ElectroMagnetic Professional

Course Overview

The EMPro course teaches users how to efficiently create three dimensional models to simulate with either the Finite Element Method (FEM) and/or the Finite- Difference Time Domain method (FDTD). The modularity of the class allows it to be adapted to either include both simulation methods – FEM & FDTD – or only FEM.

What You Will Learn

- CAD modeling using advanced constraint technology
- Parameterization of 2D and 3D objects
- Import/Export of CAD files, Simulation Models, and 3D EM Components
- Definition of boundary conditions, bounding boxes, padding
- Definition of signal sources including voltage sources and modal waveguide ports
- Definitions of sensors for sampling FEM or FDTD results in specific locations or for computing far fields
- Meshing and Gridding in FEM and FDTD
- Setting up Simulations for FEM and FDTD
- Cosimulation flow with ADS
- Post processing of simulation results

Audience

RF, microwave & HSD engineers who design passive high-frequency structures.

Prerequisites

Familiarity with RF and microwave concepts.

Course Length

1 or 2 days

Course Format

The course combines lecture presentations with instructor guided, hands-on lab exercises.

Detailed Course Agenda:

☐ Day 1

User-Interface & FEM Simulation

- GUI Architecture
- Using Object Library
- Sketch-based Geometric Modeling
- Parameterization
- Anchoring Objects and Coordinate Systems of Objects and Assemblies
- Boolean Operations, Shelling, Lofting, and other Modeling Operations
- Editing the Modeling Sequence
- Material Specification
- Open Access (OA) Libraries and native EMPro Libraries
- Modal Waveguide Ports vs. Impressed Sources
- Boundary Conditions for free space modeling and symmetry
- Bounding Boxes
- FEM Adaptive Meshing and how to effectively control it
- Exporting ADS Models to EMPro and EMPro Cosimulation with ADS
- FEM 2D Modal and Eigenmode Solvers
- Simulating Connectors, Antennas, Filters, etc.

☐ Day 2

FDTD & Sensors

- Brief overview of FDTD Theory
- Gridding of Geometries and assigning Materials to generate the FDTD Mesh
- Relationship between smallest cell size and timestep (Courant Limit)
- Grid Regions & Fixed Points to align grid with object boundaries
- Conformal Meshing in FDTD
- Time-Domain Waveforms
- Python Scripting
- Importing and Exporting CAD Models
- Sensors and Post Processing.

Delivery Location

To be defined

Delivery Dates

To be defined