Abstracts

Interfacing Unstructured Tetrahedron Grids to Structured-Grid FDTD

D.J. Riley and C.D. Turner. "Interfacing Unstructured Tetrahedron Grids to Structured-Grid FDTD." 1995 Microwave and Guided Wave Letters 5.9 (Sep. 1995 [MGWL]): 284-286.

Finite-element unstructured tetrahedron grids provide considerable modeling flexibility but can give rise to an extremely large number of cells when solving open-region problems. The finite-volume hybrid-grid (FVHG) algorithm enables unstructured grids to be combined with traditional structured-grid, rectangular-cell, finite-difference time-domain (FDTD), thereby considerably reducing the unstructured-mesh overhead in surrounding space. In this letter, a simple technique to interface free-meshed, tetrahedron grids with FDTD is described. The two grids are directly coupled without the need for spatial interpolation. The tetrahedron mesh is defined to terminate on a rectangular surface that may be located very close to the geometry under study. Absorbing boundary conditions are easily applied in the surrounding FDTD grid. This technique provides finite-element modeling flexibility with the benefits of explicit time differencing and limited unstructured-mesh overhead. Multimaterial regions can be solved. The FVHG algorithm has been found to be accurate and generally stable for the long-term, even with complex free meshes generated by advanced solid-modeling software.

❑ Return to main document.