NUMERICAL SIMULATION OF HIGH POWER MICROWAVE DEVICES WITH ICEPIC

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Abstract

The Improved Concurrent Electromagnetic Particle-In-Cell (ICEPIC) code is used to model high power microwave (HPM) devices. The Particle-in-cell (PIC) method consists of finite-difference time-domain (FDTD) electromagnetics with the addition of the relativistic Lorentz force law and charged particles. ICEPIC has been developed by numerous scientists and engineers since 1994. The code is massively parallel with scalability tested to over 16000 CPUs. The relevant physics to model HPM devices are included in the code. Recently, there is interest in using frequency dispersive and nonlinear dielectric materials in HPM devices. Efforts to model these materials in ICEPIC will be discussed.

About the Speaker: **Andrew D. Greenwood received the B.S. degree in 1993 and the M.S. degree in 1995, both from Brigham Young University in electrical engineering. He received the Ph.D. in electrical engineering in 1998 from the University of Illinois, where he studied the use of the finite element method to compute electromagnetic scattering and radiation from axisymmetric bodies. In 1996, he joined Rome Laboratory as a Palace Knight employee, and in 1998 he joined the Directed Energy Directorate of the Air Force Research Laboratory at Kirtland AFB, NM. Dr. Greenwood conducts research on numerical methods, parallel computing, and the simulation of high power microwave devices and on high power microwave antennas. He is the recognized computational electromagnetics expert in the high power microwave division, and he is one of the primary developers of the state of the art electromagnetic particle in cell code ICEPIC. Dr. Greenwood is active in the Electromagnetic Code Consortium (EMCC) and has served two terms as chair. He holds the patent for the "All Cavity Magnetron Axial Extractor", which he designed using ICEPIC simulation. He has published numerous articles in peer reviewed journals and professional conferences.**