Abstract Submitted
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Development of a GPU-Accelerated 3-D Full-Wave Code for Reflectometry Simulations[1] K.S. REUTHER, Columbia University, S. KUBOTA, UCLA, E. FEIBUSH, I. JOHNSON, PPPL — 1-D and 2-D full-wave codes used as synthetic diagnostics in microwave reflectometry are standard tools for understanding electron density fluctuations in fusion plasmas. The accuracy of the code depends on how well the wave properties along the ignored dimensions can be prespecified or neglected. In a toroidal magnetic geometry, such assumptions are never strictly correct and ray tracing has shown that beam propagation is inherently a 3-D problem. Previously, we reported on the application of GPGPU's (General-Purpose computing on Graphics Processing Units) to a 2-D FDTD (Finite-Difference Time-Domain) code ported to utilize the parallel processing capabilities of the NVIDIA C870 and C1060 [1]. Here, we report on the development of a FDTD code for 3-D problems. Initial tests will use NVIDIA's M2070 GPU and concentrate on the launching and propagation of Gaussian beams in free space. If available, results using a plasma target will also be presented. Performance will be compared with previous generations of GPGPU cards as well as with NVIDIA's newest K20C GPU. Finally, the possibility of utilizing multiple GPGPU cards in a cluster environment or in a single node will also be discussed.

[1] B.C. Rose et al., Poster JP8.00017, APS DPP09 Meeting, Nov. 2-6, 2009, Atlanta, GA

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