

MULTI-PHYSICS SIMULATIONS WITH VORPAL

David Smithe, Peter Stoltz, Ming-Chieh Lin, Dan Karipides
Tech-X Corporation, Boulder, CO, USA 80303

Haipeng Wang, Kai Tian, Gary Cheng
JLab, Newport News, VA, USA 23606

The VORPAL finite-difference time-domain particle-in-cell simulation tool has traditionally been used for accelerator, electromagnetic, and plasma simulations. Approximately two years ago, a generalized PDE (partial differential equation) capability was added to the software, and we are now developing this capability to provide multi-physics simulations capability. Our project focus is on integrated thermal & electromagnetic simulations for superconducting RF accelerators. But we are interested in broadening the scope of applications to include vacuum electronics and other physical processes in addition to EM and thermal. We present benchmarking exercises comparing the VORPAL simulations to experimental measurement, and to other multi-physics software. We also benchmark with experiment additional simulations of a complex 3-D feed-through structure for an HOM coupler.

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