Neutron Generator Power Supply Modeling in EMMA (U)

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Abstract

Sandia National Laboratories has prime responsibility for neutron generator design and manufacturing, and is committed to developing predic-tive tools for modeling neutron generator performance. An important aspect of understanding component performance is explosively driven ferroelectric power supply modeling. EMMA (ElectroMechanical Modeling in ALEGRA) is a three dimensional compile time version of Sandia's ALEGRA code. The code is built on top of the general ALEGRA frame-work for parallel shock-physics computations but also includes additional capability for modeling the electric potential field in dielectrics. The over-all package includes shock propagation due to explosive detonation, depoling of ferroelectric ceramics, electric field calculation and coupling with a general lumped element circuit equation system. The Aztec parallel iterative solver is used to solve for the electric potential. The Daspk differential algebraic equation package is used to solve the circuit equation system. Sample calculations run on Sandia's Paragon will be described. (U)