NUMERICAL SIMULATIONS OF POWER FLOW IN THE Z-ACCELERATOR DOUBLE-POST-HOLE-CONVOLUTE AND INNER MAGNETICALLY INSULATED TRANSMISSION LINE*

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The Z-accelerator[1] at Sandia National Laboratories employs a double-post-hole convolute (DPHC) to couple four magnetically insulated transmission lines (MITLs) in parallel to a single MITL to drive a dynamic Z-pinch load. Detailed magneto-hydrodynamic (MHD) models of the Z-pinch load are sensitive to current losses in this region of the machine, limiting their predictive capability. A model is presented to investigate the current loss mechanisms, focusing on magnetic insulation loss in the electron flow and electrode plasma expansion[2, 3]. To minimize computational demands, a hybrid approach is being pursued; plasmas formed on the metal feed surfaces will be treated as MHD fluids, whilst kinetic electron flow will be modeled using Particle-in-Cell (PiC) techniques. To this end, PiC algorithms have been incorporated into the 3-dimensional (3d) resistive MHD code, GORGON[4]. Initial 3d kinetic simulations of the DPHC as well as progress on the hybrid model will be presented.

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