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**Simulation Dynamics of a Multi-Material Pinch for Neutron Production on the Refurbished Z Simulator**[1] Y.K. CHONG, A.L. VELIKOVICH, J.W. THORNHILL, J. GIULIANI, Naval Research Laboratory, C.A. COVERDALE, Sandia National Laboratories — Previous Radiation MHD (RMHD) simulation studies of deuterium (D) double-shell gas-puff Z-pinch implosions driven by the Sandia refurbished Z have shown that their performance can be substantially affected by an introduction of a dense high-Z gas at the outer shell. One of the physical mechanisms playing an important role in the process is the development of multi-D structure & nonuniform gradients due to the RT instabilities. Here, we present the results from the simulations of the multimaterial (MM) gas puff Z-pinch loads from the multiphase version of the Mach2-DDTCRE code. The MM radiation transport is included to account for the radiation emission, absorption & transport from/into different materials. We will investigate the effects of different load materials/configurations such as argon-on-D on the multi-D structures, nonuniform gradients & RT formation/development. We will then characterize various performance metrics, in particular the neutron yields, of the loads as a function of mass ratio and/or radius. A comprehensive analysis of 1D/2D RMHD results will be also made to gauge the operation parameter regime & design of MM gas-puff loads.

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