

PIC/MHD MODELING OF DENSE PLASMA FOCUS IN 2D AND 3D

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We have carried out 2D and 3D simulations of dense plasma focus (DPF) devices using the MHD code ALEGRA and the electromagnetic particle-in-cell (PIC) code LSP, for the purpose of optimizing neutron production. LSP modeled the initiation phase up to 30 ns in 2D, and the resulting data was imported to ALEGRA which modeled the lift-off, rundown and pinch phases, along with thermonuclear neutron yields in 2D. In 3D, ALEGRA was used to model DPF operation starting from an informed guess for early-time plasma conditions. We compare to experimental data for a particular geometry, showing generally good agreement, including 3D features such as filamentation. Neutron yields cannot be accurately predicted by MHD codes due to their primarily non-thermonuclear origins, but we can optimize thermonuclear yield for a range of operating conditions.