Abstract Submitted
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Semi-analytic modeling and simulation of magnetized liner inertial fusion R.D. MCBRIDE, S.A. SLUTZ, S.B. HANSEN, Sandia National Laboratories — Presented is a semi-analytic model of magnetized liner inertial fusion (MagLIF). This model accounts for several key aspects of MagLIF, including: (1) pre-heat of the fuel; (2) pulsed-power-driven liner implosion; (3) liner compressibility with an analytic equation of state, artificial viscosity, and internal magnetic pressure and heating; (4) adiabatic compression and heating of the fuel; (5) radiative losses and fuel opacity; (6) magnetic flux compression with Nernst thermoelectric losses; (7) magnetized electron and ion thermal conduction losses; (8) deuterium-deuterium and deuterium-tritium primary fusion reactions; and (9) magnetized alpha-particle heating. We will first show that this simplified model, with its transparent and accessible physics, can be used to reproduce the general 1D behavior presented throughout the original MagLIF paper [S. A. Slutz *et al.*, Phys. Plasmas **17**, 056303 (2010)]. We will then use this model to illustrate the MagLIF parameter space, energetics, and efficiencies, and to show the experimental challenges that we will likely be facing as we begin testing MagLIF using the infrastructure presently available at the Z facility. Finally, we will demonstrate how this scenario could likely change as various facility upgrades are made over the next three to five years and beyond. Sandia National Laboratories is a multi-program laboratory managed and operated by Sandia Corporation, a wholly owned subsidiary of Lockheed Martin Corporation, for the U.S. Department of Energy's National Nuclear Security Administration under contract DE-AC04-94AL85000.

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