Enhancing Understanding of Magnetized High Energy Density Plasmas from Solid Liner Implosions Using Fluid Modeling with Kinetic Closures
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Hybrid Fluid/Kinetic Modeling Of Magnetized High Energy Density Plasmas[1] DAVID HANSEN, ERIC HELD, Utah State University, JACOB KING, PETER STOLTZ, Tech-X Corp, ROBERT MASTI, BHUVANA SRINIVASAN, Virginia Tech — MHD modeling with an equation of state (EOS) of the Rayleigh-Taylor (RT) instabily in Z indicates that it is seeded by the electrothermal instability. Large thermodynamic drives associated with gradients at the interface between the liner and the coronal regions distort distribution functions and likely lead to non-local transport effects in a plasma which varies from weakly to strongly coupled. In this work, we discuss using effective potential theory [2] along with a Chapman-Ensksog-like (CEL) formalism to develop hybrid fluid/kinetic modeling capabilities for these plasmas. Effective potential theory addresses the role of Coulomb collisions on transport across coupling regimes and the CEL approach bridges the gap between full-blow kinetic simulations and the EOS tables, which only depend locally on density and temperature. Quantitative results on the Spitzer problem across coupling coupling regimes will be presented as a first step.

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[2]S. D. Baalrud and J. Daligault *PRL,* **110, 235001 (2013)**

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