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Enhancing Understanding of Magnetized High Energy Density Plasmas from Solid Liner Implosions Using Fluid Modeling with Kinetic Closures[1] ROBERT MASTI, BHUVANA SRINIVASAN, Virginia Tech, JACOB KING, PETER STOLTZ, Tech-X Corporation, DAVID HANSEN, ERIC HELD, Utah State University — Recent results from experiments and simulations of magnetically driven pulsed power liners have explored the role of early-time electrothermal instability in the evolution of the MRT (magneto-Rayleigh-Taylor) instability. Understanding the development of these instabilities can lead to potential stabilization mechanisms; thereby providing a significant role in the success of fusion concepts such as MagLIF (Magnetized Liner Inertial Fusion). For MagLIF the MRT instability is the most detrimental instability toward achieving fusion energy production. Experiments of high-energy density plasmas from wire-array implosions have shown the requirement for more advanced physics modeling than that of ideal magnetohydrodynamics. The overall focus of this project is on using a multi-fluid extended-MHD model with kinetic closures for thermal conductivity, resistivity, and viscosity. The extended-MHD model has been updated to include the SESAME equation-of-state tables and numerical benchmarks with this implementation will be presented. Simulations of MRT growth and evolution for MagLIF-relevant parameters will be presented using this extended-MHD model with the SESAME equation-of-state tables.

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