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Enhancing Understanding of High Energy Density Plasmas Using Fluid Modeling with Kinetic Closures DAVID HANSEN, ERIC HELD, Utah State University, BHUVANA SRINIVASAN, ROBERT MASTI, Virginia Tech, JAKE KING, Tech-X Corporation — This work seeks to understand possible stabilization mechanisms of the early-time electrothermal instability in the evolution of the Rayleigh-Taylor instability in MagLIF (Magnetized Liner Inertial Fusion) experiments. Such mechanisms may include electron thermal conduction, viscosity, and large magnetic fields. Experiments have shown that the high-energy density plasmas from wire-array implosions require physics modelling that goes well beyond simple models such as ideal MHD. The plan is to develop a multi-fluid extended-MHD model that includes kinetic closures for thermal conductivity, resistivity, and viscosity using codes that are easily available to the wider research community. Such an effort would provide the community with a well-benchmarked tool capable of advanced modeling of high-energy-density plasmas.

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