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Development of azimuthally correlated instabilities for MagLIF seeded by electro-thermal and material strength effects JAMES PECOVER, MARCUS WEINWURM, JEREMY CHITTENDEN, Imperial College London — Magnetized liner inertial fusion (MagLIF) is a promising route to controlled thermonuclear fusion. The concept involves magnetically imploding a metal liner; a key limitation of such systems is the magneto-Rayleigh-Taylor (MRT) instability. MagLIF relevant liner implosions carried out at Sandia showed high amplitude MRT growth. 3D simulations with our MHD code Gorgon have shown that azimuthal correlation required to explain this can be contributed to by early time effects the electro-thermal instability (ETI) and an "electro-choric instability" (ECI). Shear forces can damp short wavelength perturbations while the liner remains solid, potentially setting axial wavelengths for the ETI and ECI. We can now model shear stresses in solids with Gorgon using a Johnson-Cook strength model and a bulk modulus calculated from the FEOS equation of state. Gorgon results with the strength model are compared to results from the shock hydrodynamics code iSALE. Results for liners show elongation of perturbations at the outer edge relative to the case without strength. We present results showing the model applied to liner implosions with axial magnetic fields of 0T and 10T.

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