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Mitigation of 3D Magneto-Taylor instabilities in cylindrical liner, isentropic compression experiments MARCUS WEINWURM, JEREMY CHITTENDEN, SIMON BLAND, Imperial College — Recent experiments and computational modelling at Sandia National Laboratory have led to the development of techniques for designing current pulse shapes which provide shock-less compression and acceleration of cylindrical liners. This technique allows the equation of state of the liner material to be studied under dynamic pressure loading of several Mbar. In addition, such an imploding liner could potentially be used to compress other materials to high pressure, allowing, for example, the behaviour of hydrogen-helium mixtures to be studied at temperatures and pressures comparable to the centre of Jupiter. In this paper we study the susceptibility of such designs to the magneto-Rayleigh-Taylor instability using the 3D MHD code Gorgon. The seeding of instabilities by surface machining perturbations and by the strong variations of resistivity with density and temperature, are evaluated early in the compression. The propagation and correlation of instabilities around the azimuth later in time is also studied. Finally the potential for designing implosions, in which the inner surface of the liner remains free from penetration by the instability, is evaluated.

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