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Impact of Inner Surface Perturbations on the Stability of Cylindrical Liner Implosion[1] MATTHEW WEIS, University of Michigan, KYLE PETERSON, MARK HESS, Sandia National Laboratories, Y.Y. LAU, PENG ZHANG, RONALD GILGENBACH, University of Michigan — This paper studies the effects of initial perturbations on the inner liner surface (ILS) of an imploding cylindrical liner. In MagLIF [1], nonuniform preheat of the fuel could provide an additional source of spatial nonuniformity on the ILS. A blast wave generated by the laser preheat might trigger the Richtmyer-Meshkov instability (RM) on the ILS which then serves as another seed to the Rayleigh-Taylor instability (RT) during the stagnation (deceleration) phase of the implosion. Another scenario is that the shock initiated from the outer liner surface, during current rise [2], propagates inward and is reflected at the ILS. This reflected shock would carry the initial ILS perturbations [2] which then serve as an additional seed for the magneto-RT (MRT) during the acceleration phase of the implosion. These potentially dangerous interactions are analyzed using the 2D HYDRA code. The effects of axial magnetic fields, of the initial surface roughness spectrum, and of gas fill or water fill (to examine deceleration phase RT) are studied.

[1] M. R. Gomez, et al., PRL 113,155003 (2014); Phys. Plasmas 22, 056306 (2015).
[2] M. R. Weis, et al., Phys. Plasmas 21, 122708 (2014); 22, 032706 (2015).

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