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Hydrodynamic stability of direct-drive high-gain inertial-confinement-fusion targets[1] J.W. BATES, A.J. SCHMITT, S.P. OBENSCHAIN, D. COLOMBANT, S.T. ZALESAK, Plasma Physics Division, U.S. Naval Research Laboratory, D.E. FYFE, J.H. GARDNER, Laboratory for Computational Physics and Fluid Dynamics, U.S. Naval Research Laboratory, L.J. PERKINS, Lawrence Livermore National Laboratory — Success with direct-drive high-gain targets for inertial confinement fusion depends critically on understanding (and controlling) the hydrodynamic instabilities that develop during the implosion process. A key task in this analysis is to determine the tolerances for target surface finishes and optically-smoothed laser drive. Because available experimental facilities are unable to directly assess how such nonuniformities affect ignition and yield, numerical simulations coupled with analytical modeling are extremely important. In this presentation, we discuss the status of single-mode stability calculations performed with the FAST radiation hydrocode on NRL's high-gain target designs, and compare our results against ablative theoretical models. The two-dimensional spherical simulations predict that the performance degrades significantly from the one-dimensional "clean" case, but may be improved through the use of a spike pre-pulse or "high-Z" layer.

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