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Modeling Small-Amplitude Perturbations in Inertial Confinement Fusion Pellets[1] STEVEN ZALESAK, Plasma Physics Division, NRL, N. METZLER, SAIC and Physics Dept., NRCN, Israel, A.L. VELIKOVICH, J. SCHMITT, D.G. COLOMBANT, PPD, NRL, J.H. GARDNER, LCF&FD, NRL, W. MANHEIMER, RSI, Inc. — Recent advances in inertial confinement fusion (ICF) technology serve to ensure that imploding laser-driven ICF pellets will spend a significantly larger portion of their time in what is regarded as the "linear" portion of their perturbation evolution, i.e., in the presence of small-amplitude but nonetheless evolving perturbations. Since the evolution of these linear perturbations collectively form the initial conditions for the subsequent nonlinear evolution of the pellet, which in turn determines the energy yield of the pellet, the accurate numerical modeling of these small-amplitude perturbations has taken on an increased importance. This modeling is difficult despite the expected linear evolution of the perturbations themselves, because these perturbations are embedded in a highly nonlinear, strongly-shocked, and highly complex flow field which in and of itself stresses numerical computation capabilities, and whose simulation often employs numerical techniques which were not designed with the proper treatment of small-amplitude perturbations in mind. In this paper we will review some of the techniques that we have recently found to be of use toward this end.

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