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Adaptive Mesh Refinement for ICF Calculations DAVID FYFE, C. RICHARD DEVORE, Naval Research Laboratory — This paper describes our use of the package PARAMESH to create an Adaptive Mesh Refinement (AMR) version of NRL's FASTRAD3D code. PARAMESH was designed to create an MPI-based AMR code from a block structured serial code such as FASTRAD3D. FASTRAD3D is a compressible hydrodynamics code containing the physical effects relevant for the simulation of high-temperature plasmas including inertial confinement fusion (ICF) Rayleigh-Taylor unstable direct drive laser targets. These effects include inverse bremmstrahlung laser energy absorption, classical flux-limited Spitzer thermal conduction, real (table look-up) equation-of-state with either separate or identical electron and ion temperatures, multi-group variable Eddington radiation transport, and multi-group alpha particle transport and thermonuclear burn. Numerically, this physics requires an elliptic solver and a ray tracing approach on the AMR grid, which is the main subject of this paper. A sample ICF calculation will be presented.

MacNeice et al., "PARAMESH: A parallel adaptive mesh refinement community tool," Computer Physics Communications, 126 (2000), pp. 330-354.

David Fyfe
Naval Research Laboratory

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