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Validation and Verification of the multi-material EOS and Opacity Model used in CRASH IGOR SOKOLOV, R. PAUL DRAKE, Center for Radiation Shock Hydrodynamics, University of Michigan — The laser target for the CRASH project has a complicated geometry and is manufactured from four materials. The beryllium foil, and, partly, the gold washer are directly irradiated with the laser beams, the physical conditions in them vary from very high temperatures and low densities in the laser corona till multi-hundred MBar pressure in the pusher driving the strong shock wave in xenon. Shock-compressed xenon intensely radiates, the radiation transport being responsible for the most of the observed phenomena: wall shock, generated from the irradiated tube wall, perturbations in the shocked layer of xenon, wavy xenon-beryllium interface. The capillary tube is made of two different sorts of plastic: polyimide and acrylic. To perform coupled simulations of the hydrodynamic motion and radiation transport one needs to incorporate the EOS and multi-group opacity data. For a long time we were employing a simple thermodynamic model, based on direct calculation of statistical sums and the Helmholtz free energy and accounting for the partial Fermi degeneration for electrons as well as the Coulomb interactions. In the present simulation we present the results of the validation and verification research, for the EOS and multi- group opacity model used in CRASH. First goal is a direct comparison between the EOS data tables as produced using the CRASH code with those obtained from different databases (ARTEP, PRISM and some others). We analyze the difference in the results and discuss, which of the data can be better used in simulations.

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