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Implementation of 3T Plasma With Electron Energy Advection in FLASH[1] C. GRAZIANI, K. WEIDE, S. GOPAL, D. LAMB, DOE/NNSA/ASC Flash Center, U. Chicago — FLASH is a highly capable, fully modular, extensible, professionally managed Eulerian hydrodynamic code with a wide user base. Recently we have begun adding capabilities to FLASH, to make it a highly capable code for simulations in the academic HEDP community. One of the capabilities we are adding is the ability to simulate a 3-temperature, single-fluid plasma consisting of electrons, ions, and radiation (in the diffusion approximation) that can exchange, evolve, and conduct heat. Here we describe the development of this capability and the results of verification tests to which we subject it. A key question about this approximation is how to close the dynamical system in such a way as to deal consistently with shock discontinuities. In addition to conservation of mass, momentum, and energy, and advection of radiation, one must choose an additional condition to determine the evolution. One possible choice is the conservative advection of electron entropy (up to LTE processes of heat exchange, evolution, and convection), which reproduces the classical plasma shock approximation of Shaframov (1957) under shock conditions. We describe the implementation and testing of this closure choice.

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