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Multi-species ion transport in ICF relevant conditions[1] ERIK VOLD, GRIGORY KAGAN, ANDREI SIMAKOV, KIM MOLVIG, LIN YIN, BRIAN ALBRIGHT, Los Alamos National Laboratory — Classical transport theory based on Chapman-Enskog methods provides self consistent approximations for kinetic fluxes of mass, heat and momentum for each ion species in a multi-ion plasma characterized with a small Knudsen number. A numerical method for solving the classic forms of multi-ion transport, self-consistently including heat and species mass fluxes relative to the center of mass, is given in [Kagan-Baalrud, arXiv '16] and similar transport coefficients result from recent derivations [Simakov-Molvig, PoP, '16]. We have implemented a combination of these methods in a standalone test code and in xRage, an adaptive-mesh radiation hydrodynamics code, at LANL. Transport mixing is examined between a DT fuel and a CH capsule shell in ICF conditions. The four ion species develop individual self-similar density profiles under the assumption of P-T equilibrium in 1D and show interesting early time transient pressure and center of mass velocity behavior when P-T equilibrium is not enforced. Some 2D results are explored to better understand the transport mix in combination with convective flow driven by macroscopic fluid instabilities at the fuel-capsule interface. Early transient and some 2D behaviors from the fluid transport are compared to kinetic code results.

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Erik Vold
Los Alamos National Laboratory

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