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A Multifluid Interpenetration Mix Model[1] BAOLIAN CHENG, ANTHONY SCANNAPIECO, Los Alamos National Lab — In this work, we present a multifluid interpenetration mix model that consists of a set of multifluid moment equations, with and without both internal and external fields. This model is derived from the collisional Boltzmann equation in a self-consistent manner. The external fields can be either grativational as in astrophysics and Rayleigh-Taylor (RT) mixing problems, or shock acceleration as in Richtmyer-Meshkov (RM) mixing problems, electric and magnetic fields as in magnetic confinement fusion, and rotational forces as in chemical applications. The model equations are mathematically closed and physically consistent with one free parameter, contained in a phenomenological closure for the collisional frequency, which is determined by experimental data. The set of model equations provide a theoretical foundation for a large fraction of phenomenological mix models. They contain all the physical terms, particularly the terms associated with the Reynolds stress due to both species interpenetrations and random chaotic motions. Under certain assumptions, these model equations successfully reduce to the various other mix models. The successful applications of this model in both direct drive and radiatively driven inertial confinement fusion (ICF) capsule implosions are discussed.

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