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## Consistent BGK model for high energy density plasma mixtures

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We derive a conservative multispecies BGK model that follows the spirit of the original, single species BGK model by ensuring pairwise conservation of momentum and kinetic energy and that the model satisfies Boltzmann's H-Theorem. The derivation emphasizes the connection to the Boltzmann operator, which allows for direct inclusion of information from a molecular dynamics validated effective Boltzmann model. We also develop a complete hydrodynamic closure via the Chapman-Enskog expansion, including a general procedure to generate symmetric diffusion coefficients based on this model. We further extend the model to include the effect of degeneracy on the electron plasma species. We employ this model to investigate kinetic effects on interfacial mixing of the shell-fuel interface in inertial confinement fusion, as well as experiments performed on the Z pulsed power facility.

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