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Transport properties of an asymmetric mixtures in the dense plasma regime

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We study how concentration changes ionic transport properties along isobars for mixtures of hydrogen and various higher charge elements, Li, C, Al, Cu, and Ag, representative of turbulent layers relevant to inertial confinement fusion and astrophysics. Hydrogen will typically be fully ionized while other elements will be only partially ionized but can have a large effective charge. This will lead to very different physical conditions for the H and the other elements. Large first principles orbital free molecular dynamics simulations are performed, and the resulting transport properties are analyzed. Comparisons are made with transport theory in the kinetic and coupled regimes. The addition of a small amount of heavy element in a light material has a dramatic effect on viscosity and diffusion of the mixture.