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Modeling viscosity and diffusion of plasma mixtures across coupling regimes PHILIPPE ARNAULT, CEA, DAM, DIF 91297 Arpajon, France — Viscosity and diffusion of plasma for pure elements and multicomponent mixtures are modeled from the high-temperature low-density weakly coupled regime to the low-temperature high-density strongly coupled regime [1]. Thanks to an atom in jellium modeling, the effect of electron screening on the ion-ion interaction is incorporated through a self-consistent definition of the ionization. This defines an effective One Component Plasma, or an effective Binary Ionic Mixture, that is representative of the strength of the interaction [2, 3]. For the viscosity and the interdiffusion of mixtures, approximate kinetic expressions are supplemented by mixing laws applied to the excess viscosity and self-diffusion of pure elements. The comparisons with classical and quantum molecular dynamics results reveal deviations in the range 20-40% on average with almost no predictions further than a factor of 2 over many decades of variation. Applications in the inertial confinement fusion context could help in predicting the growth of hydrodynamic instabilities.

[1] Arnault, HEDP 9 (2013) 711
[2] Clérouin et al, PRE 87 (2013) 61101
[3] Arnault et al, PRE 88 (2013) 63106

Philippe Arnault
CEA, DAM, DIF 91297 Arpajon, France

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