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Viscosity and mutual diffusion of deuterium-tritium mixtures in the warm dense matter regime JAMES S. COHEN, D.A. HORNER, Los Alamos National Laboratory, F. LAMBERT, CEA, DAM, DIF, J.D. KRESS, L.A. COLLINS, Los Alamos National Laboratory — Viscosity and mutual diffusion in the deuterium-tritium (DT) mixture are important input properties for modeling inertial-confinement plasmas. We have calculated viscosity and mutual diffusion of DT in the pertinent warm, dense matter regime for densities from 5 to 20 g/cm^3 and temperatures from 2 to 10 eV, using both finite-temperature density-functional theory molecular dynamics (QMD) and orbital-free molecular dynamics (OFMD). QMD treats the electrons quantum mechanically through finite-temperature density-functional theory. OFMD treats the kinetic energy of the electrons semiclassically. Both treat the nuclei classically. These two treatments are in generally good agreement. Comparisons are also made with simple models, esp.the one-component plasma (OCP) model. The reduced diffusion and viscosity coefficients are found to depend largely, though not completely, only on the Coulomb coupling parameter Γ (the ratio of potential energy to kinetic energy), with a minimum in the reduced viscosity at $\Gamma \approx 25$, approximately the same position found in the OCP simulations.

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