Shear Viscosity of the One-Component Plasma across Coupling Regimes JEROME DALIGAULT, Los Alamos National Laboratory, SCOTT BAALRUD, University of Iowa, KIM RASMUSSEN, Los Alamos National Laboratory — The shear viscosity coefficient of the one-component plasma is calculated with unprecendented accuracy using molecular dynamics simulations across the entire fluid regime, i.e. from the weakly-coupled regime to the liquid-solid phase transition. The simulations shed light on the two momentum transport mechanisms at the origin of the shear viscosity, namely the bodily movement of particles (that dominates at small coupling) and the action of interactions at a distance (that dominates at large coupling). Their competition results in a minimum of the (reduced) viscosity between the gas-like and liquid-like regimes. Our recently developed effective potential theory of transport coefficients[1] is shown to compare well with the molecular dynamics simulations. A practical model is presented that spans the entire fluid regime.

[1]Baalrud, Daligault, Phys. Rev. Lett. 110, 235001 (2013)

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