CORRELATIONS BETWEEN THE SHEAR VISCOSITY AND THERMAL CONDUCTIVITY COEFFICIENTS OF DENSE SIMPLE LIQUIDS

Khrapak A.G.,* Khrapak S.A.

JIHT RAS, Moscow, Russia
*khrapak@mail.ru

Motivated by the excess entropy scaling of transport coefficients, we look for correlations between the properly reduced shear viscosity and thermal conductivity coefficients of dense liquids. We demonstrate that correlations exist and this can be considered as an analogue of the Stokes-Einstein relation between the self-diffusion and shear viscosity coefficients. Results presented for four simple model systems with different pairwise interaction potentials (Lennard-Jones, Coulomb, inverse sixth power, and hard-sphere) as well as for six real atomic and molecular liquids (Ar, Kr, Xe, CH_4, O_2 and N_2) support this conclusion and allow to identify several universality classes. Practical fits relating shear viscosity and thermal conductivity coefficients are proposed.