

Features of collective dynamics in supercritical fluids

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The issue of possible difference in "liquid-like" and "gas-like" dynamic properties of supercritical fluids suggested in [1] has attracted huge attention of experimental, theoretical and simulation groups. Experiments on inelastic X-ray scattering [2,3,4], theory [5] and simulations [5,6] indicated that non-hydrodynamic process of structural relaxation is responsible for so-called "positive dispersion" of collective excitations in supercritical fluids. However the very recent simulation studies point out that collective dynamics in supercritical fluids is more complex than it was thought before: not only structural relaxation but some other non-hydrodynamic collective processes contribute to "positive dispersion" of collective excitations in supercritical region.

In this talk we report recent advance in simulations and theoretical analysis of collective dynamics of supercritical Lennard-Jones fluids and model soft sphere fluids. The main features of dynamic structure factors, dispersion of collective excitations, the issue of "positive dispersion" and its origin will be discussed.

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- [4] G.G.Simeoni *et al.* Nature Phys. **6**, 503 (2010)
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- [6] T.Bryk, G.Ruocco. Mol.Phys. **109**, 2929 (2011)