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Acceleration of non-Newtonian multiphase flow computations via CPU-GPU platforms ARTURO FERNANDEZ, North Carolina A&T State University — Modeling of multiphase flow involving non-Newtonian fluids presents special challenges due to the wide range of scales associated with these systems. The reproduction of viscoelastic properties can be done either using constitutive equations derived from kinetic theory or by modeling the dynamics of suspension of macromolecules at the mesoscopic or molecular scale. We present results combining front-tracking with Brownian dynamics simulations, which capture non-Newtonian properties at the mesoscopic scale in a more realistic fashion but at the expense of higher computational cost. We discuss the acceleration of the computations using CPU-GPU platforms. The continuum simulations are carried out in CPUs as usual but the Brownian dynamics simulations are parallelized so they can be performed in GPUs. The examples include the settling of a solid particle in an elastic fluid, the so-called standard case, and the deformation of an elastic drop in a simple shear flow. Good agreement between experimental and numerical results is found.

Arturo Fernandez
North Carolina A&T State University

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