SDPD SIMULATION OF CONFINED PARTICLE SUSPENSIONS UNDER SHEAR FLOW

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We present two-dimensional simulation results of hard particles suspended in a Newtonian solvent under shear flow by using the Smoothed Dissipative Particle Dynamics method (SDPD)[1]. SDPD is a Lagrangian mesh free method, which is able to discretize the Navier-Stokes equations and to incorporate thermal fluctuations on the hydrodynamic variables in a thermodynamically consistent way. Rigid structures are modeled by frozen SDPD particles and hydrodynamic interactions (HI) are taken into account implicitly[2]. Below given resolution dependence scale, HI are corrected using lubrication theory.

In this work, the apparent viscosity for suspensions confined in a micro-channel and undergoing a Couette flow will be investigated and its dependence on particle concentration and shear rate are analyzed in detail. Finally, the efect of confnement as well as the "particle clustering" on the shear-thickening behavior occurring at high shear rate will be discussed[3].

References

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