Abstract Submitted
for the MAR14 Meeting of
The American Physical Society

Dissipative Particle Dynamics simulation of colloidal suspensions

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— DPD as a mesoscale method was firstly proposed to study dynamics of suspensions under flow condition. However the proposed method failed to capture shear properties of suspensions because it lacked: first a potential to reproduce lubrication forces and second a clear definition for the colloid surface. Recently we reported a modified DPD method which defines colloidal particles as particles with hard core and a dissipative coat. An additional lubrication force was introduced to include the short-range hydrodynamics that are not captured in original DPD. The model was found to be able to reproduce shear properties of suspensions for a wide range of different systems, from monodisperse to bimodal with different volume fractions, compositions and size ratios. In present work our modified DPD method is employed to study both equilibrium and flow properties of colloidal suspension. Zero shear viscosity of suspension is measured using Green-Kubo expressions and the results are compared to theoretical predictions. Furthermore, structure formation in suspensions is studied in respect to energy landscape of the fluid both at rest and under flow.

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Date submitted: 15 Nov 2013 Electronic form version 1.4