

Abstract Submitted
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Multiscale modeling of sickle anemia blood flow by Dissipative Particle Dynamics HUAN LEI, BRUCE CASWELL, GEORGE KARNIADAKIS, Brown University — A multi-scale model for sickle red blood cell is developed based on Dissipative Particle Dynamics (DPD). Different cell morphologies (sickle, granular, elongated shapes) typically observed in *in vitro* and *in vivo* are constructed and the deviations from the biconcave shape is quantified by the Asphericity and Elliptical shape factors. The rheology of sickle blood is studied in both shear and pipe flow systems. The flow resistance obtained from both systems exhibits a larger value than the healthy blood flow due to the abnormal cell properties. However, the vaso-occlusion phenomenon, reported in a recent microfluid experiment, is not observed in the pipe flow system unless the adhesive interactions between sickle blood cells and endothelium properly introduced into the model.

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