Abstract Submitted
for the DFD16 Meeting of
The American Physical Society

**Stable low-resolution simulations of two-dimensional vesicle suspensions** GOKBERK KABACAOGLU, University of Texas at Austin, BRYAN QUAIFE, Florida State University, GEORGE BIROS, University of Texas at Austin — Vesicles, which resist bending and are locally inextensible, serve as experimental and numerical proxies for red blood cells. Vesicle flows, which are governed by hydrodynamic and elastic forces, refer to flow of vesicles that are filled with and suspended in a Stokesian fluid. In this work we present algorithms for stable and accurate low-resolution simulations of the vesicle flows in two-dimensions. We use an integral equation formulation of the Stokes equation coupled to the interface mass continuity and force balance. The problem poses numerical difficulties such as long-range hydrodynamic interactions, strong nonlinearities and stiff governing equations. These difficulties make simulations with long time horizons challenging, especially at low resolutions. We develop algorithms to control aliasing errors, correct errors in vesicle's area and arc-length, and avoid collision of vesicles. Additionally, we discuss several error measures to study the accuracy of the simulations. Then we closely look at how accurate the low-resolution simulations can capture true physics of the vesicle flows.

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Date submitted: 13 Jul 2016 Electronic form version 1.4