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Veerapaneni Shravan, NY, and **Denis Gueyffier**, **George Biros** and **Denis Zorin***
(dzorin@cims.nyu.edu). *Numerical Simulation of Fluid Membranes in Stokesian flow.*

Stokesian fluid interacting with immersed deformable particles is a useful model for many applications. Examples include modeling of dynamics of bubbles and droplets, blood flow in small blood vessels and the dynamics of intra-cellular and extra-cellular vesicles. I will describe a fast solver for Stokes fluids interacting with deformable area-preserving membranes based on integro-differential problem formulation, which allows us to use degrees of freedom on boundaries only. Our solver combines high-order spatial discretization of membranes with FMM acceleration with novel preconditioning scheme and semi-implicit time-stepping scheme to resolve the membrane motion accurately and efficiently. I will discuss time-stepping and stability restrictions, and present numerical results that demonstrate the performance of the algorithm. (Received September 16, 2008)