Abstract Submitted
for the DFD10 Meeting of
The American Physical Society

Accelerated Boundary Integral Method in Non-periodic Geometries and Applications to Flowing Capsules and Cells AMIT KUMAR, MICHAEL GRAHAM, University of Wisconsin-Madison — We present a fast O(NlogN) solution technique for the Stokes flow boundary integral equation in an arbitrary geometry. The acceleration is achieved via the use of the General Geometry Ewald Like Method (GGEM) for computing the Green's function and its associated stress tensor in the geometry of interest. In this talk, we first present an alternative formulation of the boundary integral equation that allows the use of GGEM. In this formulation, we get a second kind integral for the unknown surface tractions rather than the unknown surface velocity as is common for problems with non-matched viscosities in interfacial flows. An efficient methodology is then presented for calculating the single and the double layer integrals in the resulting formulation using the Green's function mentioned above. Our method will be compared with other accelerated boundary integral techniques for Stokes flow. The efficacy of the method will be demonstrated by the solution of several large scale test problems involving the flow of capsules and red blood cells in a slit geometry.

Amit Kumar
University of Wisconsin-Madison

Date submitted: 05 Aug 2010 Electronic form version 1.4