Abstract Submitted
for the DFD07 Meeting of
The American Physical Society

High order quadratures to compute evolution of axis-symmetric interfacial Stokes flows MONIKA NITSCHE, Univ of New Mexico, HECTOR CENICEROS, UCSB, AINO KARNIALA, Birkerod Gymnasium, Denmark — Boundary integral methods have been used widely for the simulation of interfacial Stokes flows. These methods reduce the dimensionality of the problem by one since the fluid velocity reduces to an integral over the interface. In the case of axisymmetric interfaces it is difficult to approximate these integrals accurately. The integrands have singular behaviour at the symmetry axis and as a result, existing quadrature rules are, at best, of a limited second order accuracy. Furthermore, cancellation of large terms introduces large roundoff errors. In this work, we propose a new numerical approach to overcome these difficulties. The approach is based on analytic error corrections constructed from an asymptotic analysis of the integrands. We present quadratures that achieve a uniform accuracy of order five, apply them to compute the evolution of a drop, and demonstrate numerically their superior accuracy and efficiency.

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Date submitted: 03 Aug 2007 Electronic form version 1.4