1067-76-1364 **M. Hameed*** (mhameed@uscupstate.edu), University of South Carolina Upstate, Division of MCS, 800 University Way, Spartanbburg, SC 29303, and **J. Morris**. *Mathematical model of a liquid jet breakup containing solid particles.*

The phenomenon of liquid jet breakup is studied for the case of a very viscous jet containing one or more solid particles. A mathematical model is derived which represents the complex dynamics as a combination of two relatively simpler problems. Governing equations for the dynamics are derived for Stokes flow using long wavelength assumptions for the capillarity-driven flow, and the influence of the force-free particle is represented by a symmetric hydrodynamic force dipole, also termed a stresslet. The total flow field is the combination of the "outer" long wavelength approximated flow, combined with the "inner" flow induced by the force dipole representation of a particle. Imposing the standard stress balance and kinematic condition at the jet surface to the combined flow leads to a well-posed problem for the evolution of the jet shape. The model equations are solved numerically by an implicit finite-difference scheme. The theoretical calculations based on this hybrid long wavelength and singularity approach yield qualitatively accurate and encouraging agreement with experimental observations. Results of calculations for one particle centered or off-center and for two particles are presented. Results showing the influence of varying particle size are also presented. (Received September 20, 2010)