Abstract Submitted
for the DFD19 Meeting of
The American Physical Society

Optimal Capillary Breakup Rheometer Procedures for Newtonian Filaments[1] SUBRAMANIAM BALAKRISHNA, WILLIAM SCHULTZ, University of Michigan (Ann Arbor, MI, US) — The differential analysis of McCarroll et al (2016) determines the surface tension to viscosity ratio from the symmetry point of an unsteady Newtonian filament profile and its derivatives. The experimental challenges are twofold: (a) the fourth derivative of the free surface radius is required and difficult to extract from low-resolution, pixelated and possibly noisy images and (b) the sensitivity of the surface tension to viscosity ratio to the stretch history. In particular, for filament evolution dominated by viscosity and surface tension, stretching too quickly makes the free surface profile nearly cylindrical, while stretching too slowly yields a quasi-static profile with no viscous information. We give strategies that optimize the ratio measurement including use of higher-order finite difference stencils and measurements made during stretch.

[1]Supported by National Science Foundation Fluid Dynamics Program

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Date submitted: 01 Aug 2019 Electronic form version 1.4