Flow of Yield-Stress Fluids in Confined Geometries*

Thalia Magyar,† Tamie L. Poepping, and John R. de Bruyn‡

Department of Physics and Astronomy,

University of Western Ontario, London, Ontario, Canada, N6A 3K7

Previous work has shown that the rheology of yield-stress fluids can change when they are confined to channels with dimensions similar to the length scale of the fluid's microstructure [1]. A full understanding of the effect of confinement on the rheological properties of complex fluids requires knowledge of the microstructure of the material as well as its flow behaviour. We are studying the flow behaviour of solutions of Carbopol and pNIPAM microgels pumped through quasi-one-dimensional microchannels with cross-sectional dimensions ranging from 500 μm down to 10 μm. The three-dimensional velocity profiles are measured using particle image velocimetry and compared to predictions based on measured the bulk rheology. The microstructure and the size of the microgel particles are studied using flourescence confocal microscopy and dynamic light scattering. We will present results on the effects of channel dimensions on the rheology and microstructure of these yield-stress materials.

[1] Y. Liu, D. Lorusso, D. W. Holdsworth, T. L. Poepping, and J. R. de Bruyn, Effect of confinement on the rheology of a yield-stress fluid. J. of Non-Newt. Fluid Mech. **261**, 25 (2018).

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†Electronic address: tmagyar2@uwo.ca

‡Electronic address: debruyn@uwo.ca