Abstract Submitted
for the DFD20 Meeting of
The American Physical Society

Inkjet printing of viscoelastic fluids – Effect of particle and polymer concentration on the jetting of weakly viscoelastic solutions KASHYAP RAJAN, JONATHAN ROTHSTEIN, University of Massachusetts, Amherst — The addition of polymeric binders and micron-sized particles to inkjet fluids can have effects that are both detrimental and advantageous to the jetting process. We will present an experimental study of how micro particle concentration and polymer properties including molecular weight, backbone rigidity and concentration effect jetting. Industrial inkjet fluids are weakly viscoelastic and challenging to characterize. Here we measured the extensional rheology using the extremely sensitive drip onto substrate capillary breakup extensional rheometry (CaBER DoS). The effect of extensional rheology on jetting were probed using a high speed imaging techniques to accurately capture the drop formation and pinch off dynamics. With increasing polymer concentration, molecular weight, backbone flexibility and particle concentration, the jet breakup dynamics transition from being dominated by inertial effects to being governed by elastic effects. This transition was quantified by measuring satellite drop size and relative velocity, droplet breakup time and breakup distance, and the persistence of the fluid threads connecting primary drops. The satellite drop velocity was found to be especially sensitive to the presence of fluid elasticity.

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Date submitted: 10 Aug 2020 Electronic form version 1.4