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Dynamics of impulsively induced viscoelastic jets EMRE TURKOZ, ExxonMobil Research and Engineering, Corporate Strategic Research, HOWARD STONE, CRAIG ARNOLD, LUC DEIKE, Princeton University — Understanding the physics of viscoelastic liquid jets and their breakup is relevant to jet-based printing and deposition techniques. In this study, we study the behavior of jets induced from viscoelastic liquid films. We use the mechanical impulse provided by a laser pulse to actuate jet formation. The parameter space governing the maximum jet length and the droplet size of the resulting viscoelastic liquid jets is investigated using simulations, which are validated with experiments. To investigate the effect of viscoelasticity, we present direct numerical simulations and solve the two-phase axisymmetric momentum equations together with the volume-of-fluid technique for interface tracking and the log-conformation transformation to solve the viscoelastic constitutive equation. We show that changing the Deborah number, which denotes the ratio between the elastic and capillary time scales, can change the resulting droplet size and the maximum jet length, so that it is possible to increase the resolution of jet-based printing and deposition techniques by modifying the elasticity of the liquid material to be printed.

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