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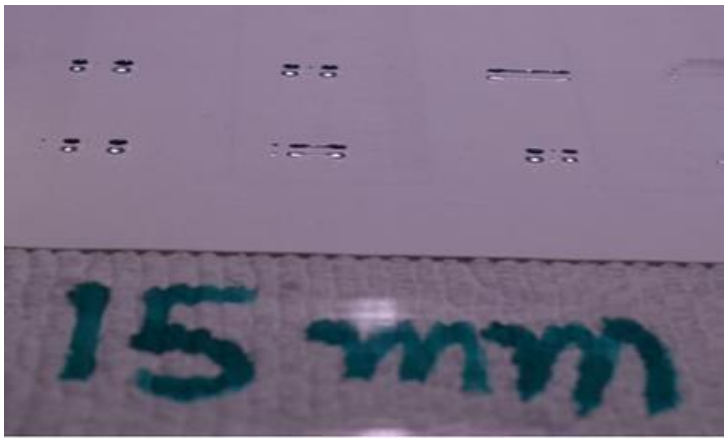
The breakup of viscous filaments has, and is being studied experimentally, theoretically, and numerically. In this study, we focus on the breakup of finite size liquid filaments on substrates, using direct numerical simulations. Although there are many parameters involved when determining whether a liquid filament breaks up, we illustrate the effects of three parameters: Ohnesorge number, the ratio of the viscous forces to inertial and surface tension surfaces, the liquid filament aspect ratio, and a measure of the fluid slip on the substrate, i.e. slip length. Through these parameters, we are able to determine whether a liquid filament breaks up into one or multiple droplets or collapse into a single droplet on the substrate. We compare our results with the results for free standing liquid filaments. We show that the presence of the substrate promotes breakup of the filament. We also discuss the effect of the degree of slip on the break up. We comprehensively explore the parameter domain regions when including the slip effects. Partial support by NSF-CBET-1604351 is acknowledged.

Figure 1: Experiments: A 9mm long filament collapses into one single drop and –



(b) a 15mm long filament breaks up into two drops.

Figure 2: Simulations: Direct numerical computation of a filament (a) –

that breaks up into multiple drops (b).