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Jet Break-Up in Drop-on-Demand Inkjet Printing in the Presence of Surfactants[1] EVANGELIA ANTONOPOULOU, OLIVER HARLEN, MARK WALKLEY, NIKIL KAPUR, University of Leeds — The rapid development of new applications for inkjet printing and increasing complexity of the inks has created a demand for in-silico optimisation of the ink jetting performance. Surfactants are often added to aqueous inks to modify the surface tension. However, the rapid expansion of the free surface during the fast jetting process means local areas of the surface will be depleted of surfactants leading to surface tension gradients. We present numerical simulations of inkjet break-up and drop formation in the presence of surfactants investigating both the surfactant transport on the interface and the influence of Marangoni forces on break-up dynamics. In particular, the initial phase of a pull-push-pull drive waveform leads to a concentration of surfactants at the front of the main drop with the trailing ligament being almost surfactant free. The resulting Marangoni stresses act to delay and can even prevent the break-off of the main drop from the ligament. The presence of surfactants also reduces the mobility of the surface of the droplet, modifying the internal flow within the droplet and enhancing the viscous dissipation.

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