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Inverted Break-up Behaviour in Continuous Inkjet (CIJ) Printing[1] CLAIRE MCILROY, OLIVER HARLEN, NEIL MORRISON, Univ of Leeds — Although droplet creation during continuous jetting of Newtonian fluids has been widely studied, unsolved problems surrounding the break-up dynamics remain. Jetting through a nozzle creates a stream of liquid that is rendered unstable by surface tension. This instability creates a succession of main drops connected by thin filaments, with drop separation determined by the fastest growing wavelength. In order to control break-up and increase printing speeds, continuous inkjet (CIJ) printing exploits the effects of finite amplitude modulations in the jet velocity profile giving conditions where jet stability deviates from the usual Rayleigh behaviour. To explore these non-linear effects, we have developed a one-dimensional jetting model. In particular, we identify a modulation range for which pinching occurs upstream of the connecting filament, rather than downstream – a phenomenon we call "inverted" break-up. Furthermore, this behaviour can be controlled by the addition of harmonics to the initial driving signal. Our results are compared to full axisymmetric simulations in order to incorporate the effects of nozzle geometry.

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