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Experimental and numerical investigation of microjet breakup of dilute polymer solutions WIM VAN HOEVE, VINCENT KAMPHORST, MICHEL VERSLUIS, DETLEF LOHSE, Physics of Fluids Group, University of Twente, The Netherlands — Droplet formation from the breakup of a microjet of dilute polymer solution is investigated using ultra high-speed imaging up to 1 million frames per second and by means of a one-dimensional model based on the slender-jet approximation. A liquid emanating from a nozzle at sufficiently large velocity forms a jet that is inherently unstable and spontaneously breaks up into droplets to minimize its surface energy. The addition of a small amount of long flexible polymers (*i.e.* polyethylene oxide) to the liquid dramatically influences this breakup process. In the final stage of the collapse – when the shear rate in the liquid increases – the polymer chains stretch and parallelize in the direction of the main flow, which results in a significantly increase of the local viscosity, and hence strong non-Newtonian behaviour. In this work we make a direct comparison between the ultra high-speed imaging results and those obtained from a simplified one-dimensional model.

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