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Drop Impact of a Shear-Thinning Fluid MARKUS BUSSMANN, MICHAEL LUCENTE, DAVID JAMES, University of Toronto — The impact of a liquid drop onto a solid surface is an event ubiquitous in a wide range of natural and industrial processes, and thus has been extensively studied. While nearly all research has focused on characterizing the impact of a Newtonian fluid drop, recent experimental work has demonstrated that non-Newtonian effects, and in particular elasticity, can dramatically affect drop impact behaviour. In this work, we take a first step towards characterizing non-Newtonian drop impact, by examining the spread of a drop of shear-thinning fluid. The approach is computational: we have developed an axisymmetric VOF model of drop impact, that incorporates recently developed approaches to interface reconstruction and the modeling of surface tension, and includes a Cross model of shear-thinning behaviour. A series of drop impact simulations were run, systematically varying each of the three parameters of the Cross model to examine the influence of shear-thinning on the overall behaviour of the droplet during spread. The results were then fit to a Newtonian correlation for maximum spread (a function of the Reynolds and Weber numbers), by modifying the Reynolds number by introducing a viscosity calculated from a characteristic shear rate.

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