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Regimes in secondary atomization of shear thinning inelastic drops VARUN KULKARNI, JONATHAN ROCHA, PAUL SOJKA, Purdue University — Secondary atomization plays a key role in the determining the eventual drop size distribution of a spray from an injector. Studies until recently have primarily focused on drops made of Newtonian or viscoelastic fluids. However, little is known about the breakup of single drop made of a shear thinning fluid subjected to cross flow of air. In this study we attempt to classify, experimentally, the regimes of breakup and morphology of an inelastic, shear thinning drop. Six different CMC water/glycerine based solutions are tested. The morphological patterns are classified on a We/Oh^2 - $1/Oh^2$ plot using the zero shear rate viscosity where We denotes the Weber number and Oh is the Ohnesorge number. The regime boundaries for the various breakup patterns are juxtaposed with their Newtonian counterparts to highlight the differences. We observe a dependence on the Carreau number, Cu and power law index, n. The results converge to the Newtonian limit for particular cases of Cu and n.

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