Gas-driven displacement of a non-Newtonian liquid in a radial Hele-Shaw cell ANDREW WHITE, THOMAS WARD, Iowa State University, Department of Aerospace Engineering — The displacement of a non-Newtonian liquid by a less viscous fluid has applications in a number of industries such as lubricating oils, injection molding and cement placement in oil wells to name a few. A convenient geometry to study such a problem is that of the Hele-Shaw cell due to its ability to effectively reduce the flow to two dimensions when the gap spacing is much smaller than the other spatial dimensions. We will study the radial displacement of a finite drop of non-Newtonian shear-thinning and extensionally-thickening liquid by a gas at constant pressure in a Hele-Shaw cell with gap spacing O(10-100) microns. Different concentrations of a polymer in oil will be used to examine changes in the displacement rate, residual film thickness and resulting Saffman-Taylor instability as the viscoelastic time scale overtakes that of the bulk displacement.

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