Abstract Submitted for the DFD12 Meeting of The American Physical Society

Contact line instability of gravity-driven flow of power-law fluids BIN HU, SARAH KIEWEG, University of Kansas — In our previous studies, we developed 2D and 3D models to simulate a power-law fluid flowing down an incline. This study is intended to examine how the shear-thinning effect of the fluid can influence the fingering instability for arbitrary wavenumbers in gravity-driven thin film flow. We apply the linear stability analysis method on our 3D power-law model and use Taylor series to approximate the power terms in the power-law evolution equation. The perturbation and the growth rate are obtained numerically for different wavenumbers. Parametric study is performed to investigate the impact of shear-thinning index on the growth rate of perturbation. For the assessment of this study, we compare the result of this study with the existing result for Newtonian fluids in literature. The wavelength and growth rate obtained in this study are also compared to our previous 3D simulation results and experimental results.

> Bin Hu University of Kansas

Date submitted: 03 Aug 2012

Electronic form version 1.4