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Control of smearing during wiping stage of gravure printing of electronics UMUT CEYHAN, University of California, Berkeley; Izmir Katip Celebi University, S. J. S. MORRIS, University of California, Berkeley — During gravure printing, a blade wipes the excess liquid from the engraved gravure roll, the objective is leaving liquid filled cells defining the image to be printed. Capillarity, however, draws some liquid from cell into a meniscus connecting to the blade; and the continuing motion of gravure roll smears that meniscus over its surface. Smearing delivers features lacking in sharpness at the micron scale. Ceyhan and Morris (BAPS.2015.DFD.M8.10) analyze smear formation for the blade–liquid contact angles covering the range $0 \leq \theta < \pi/2$ and show that the problem can be treated in plane. Using numerical solutions of the corresponding free boundary problem for the Stokes equations of motion, we show[1] that hydrostatic theory provides an upper bound for the smear volume for finite Ca. The approach of trailing edge of the cell to the meniscus isolates a certain volume of liquid from the cell, the isolated liquid is deformed with the continuing motion of gravure roll. The problem of controlling smear formation now reduces to the simpler problem of reducing the quantity of liquid drawn into the meniscus. The theory explains why polishing to reduce the tip radius of the blade is an effective way to control smearing.

[1]Ceyhan and Morris, *J. Fluid Mech.* submitted 2016

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