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Iridescent Patterns and Flows in Vertical Foam Films EWELINA WOJCIK, SUBINUER YILIXIATI, WILL ABBOTT-KLOSTERMANN, VIVEK SHARMA, Chemical Engineering, University Of Illinois Chicago — Liquid foams consist of bubbles separated by thin films. Individual films consist of two surfactant-laden surfaces that are $\sim$ 5 nm – 10 micron apart. Sandwiched between these interfacial layers is a fluid that drains primarily under the influence of gravitational, viscous and interfacial forces, including disjoining pressure. Understanding and controlling the drainage kinetics of thin films is an important problem that underlies the stability, lifetime and rheology of foams and emulsions. We experimentally follow the drainage kinetics of foam films using imaging & color science. Interference between light reflected from two surfactant-laden surfaces that are $\sim$ 100 nm - 10 micron apart leads to thickness-dependent iridescent colors in the visible region. Below 50 nm the thin films appear as black. We find fascinating examples of two-dimensional hydrodynamics and unexplained, if not unprecedented, drainage kinetics. In particular, we study the origin of marginal regeneration, i. e. the complex flow patterns that originate near the borders of foam films.

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