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Models for metallic foam lamellae[1] MICHAEL B. GRATTON, STEPHEN H. DAVIS, Northwestern University — We consider a pure liquid film with two liquid-gas interfaces — a free film — in two dimensions. Assuming that the aspect ratio of the film thickness to the arc length of the center-line is small, we develop a set of models using lubrication theory for the evolution of the film including the effects of different gas pressures above and below the liquid as well as strong surface tension. These models show a separation of timescales between center-line relaxation, thickness averaging, and drainage due to an applied pressure gradient along the film. Interpreted in the case of surfactant-free foams, these results show that the lamella separating two bubbles in an unstable foam will quickly assume a center-line that is an arc of a circle. Thereafter, the film will become uniform in thickness and drain due to capillary suction from adjoining Plateau borders.

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