Stephen H. Davis  
Northwestern University  

Dynamics of foams

We consider a low liquid-fraction foam which necessarily has the gas bubbles crowded together separated by thin films that intersect at plateau borders. Further, we consider clean forms so no surfactant is present as would be the case when the liquid is composed of a metal. Given an array of bubbles initially, the foam will coarsen as follows. The thin films drain into the plateau borders by capillary forces and when they have thinned sufficiently rupture by van der waals instability. The rupture causes neighboring bubbles to coalesce leading to cascades of ruptures and perhaps resulting in one large bubble. A new network model is presented that can follow the foam evolution for long times, the model possesses asymptotically correct microdynamics, and the simulation has no adjustable parameters. Scaling laws are obtained. Further, protocols for freezing the foam into a porous solid are given.