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Liquid loss from foams with low water content MICHAEL CONROY, JUSTIN TAYLOR, JOHN FARLEY, JAMES FLEMING, RAMAGOPAL ANANTH, Naval Research Laboratory — The liquid content of a foam can be significantly affected by liquid loss (drainage), a process that occurs both during and after the foam fills a space. We develop a theoretical model to describe liquid loss and evolution of average liquid volume fraction over time for advancing and static foams. We also perform bench-scale drainage experiments on foams with low water content. The theoretical model shows a constant drainage rate during the filling process which decays exponentially after a static column is formed. The measured loss of liquid is found to be in good agreement with the theoretical predictions. We find that drainage is greatly affected by the time scale for filling a space with foam. Significant effects on drainage are also found by varying bubble size, foam column height, and initial liquid content. The study indicates that drainage behavior can substantially deviate from that described by free-drainage theories, which assume that drainage initiates from a foam of static height.

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