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How Fluid Accumulation Affects the Dynamics of Bubble Growth and Rearrangements ANTHONY CHIECO, DOUGLAS DURIAN, University of Pennsylvania — In dry 2d foams a bubble grows or shrinks according only to its number of sides, $dA/dt=K_o(n\text{-}6)$. This von Neumann law is exact for a purely dry two-dimensional foam with no liquid content, but is increasingly violated for wetter quasi-2d foams where fluid accumulates in Plateau borders and vertices. Accounting for both the overall liquid content of the foam and the size of the Plateau borders extending into a third dimension, we modify von Neumann's law to a generalized coarsening equation where bubble size and shape now matter. To test this experimentally, we measure the growth rate of individual bubbles in quasi-2d foams of variable wetness confined between parallel plates. Interestingly, some 6-sided bubbles grow and others shrink - in direct violation of the usual von Neumann law but in agreement with our prediction. We demonstrate a shape parameter "circularity" is responsible for the violations of von Neumann's law observed in 6-sided and other n-sided bubbles. Additionally, dynamical heterogeneities like T1 events result from coarsening and lead to a relaxation of the foam structure. We present preliminary results on identifying the locations of rearrangements and explore the potential for using softness and machine learning to predict when and where they occur.

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