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Dissipation in 2D Foam Flow

Isabelle Cantat, Renaud Delannay

Rennes University, France

We study the dynamical behavior of large bubbles embedded in the plug flow of a 2D foam made of smallest bubbles. At a critical velocity the foam structure becomes instable and the largest bubbles migrate through the foam faster than the mean flow. This size segregation is due to viscous effects and happens only for flow velocities larger than a given threshold. We compare our theoretical predictions (Cantat, Delannay, Phys. Rev. E. 2003) to experimental and numerical recent results and thus we give a extended description of this original instability involving the full visco-elastic properties of the foam. We show that the phenomenon can induce flow destabilization with dramatic effects on foam transport, like avalanches of film ruptures and flow intermittency.

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