

Abstract Submitted
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Finite time singularity in a glass¹ FRANCOIS GALLAIRE, FRANCESCO VIOLA, Laboratory of Fluid Mechanics and Instabilities, STI, EPFL, Lausanne, Switzerland, BENJAMIN DOLLET, Institut de Physique de Rennes, UMR 6251 CNRS/Universite de Rennes 1, Rennes, France, PIERRE-THOMAS BRUN, Department of Mathematics, Massachusetts Institute of Technology, Cambridge, Massachusetts 02139, USA — Using a simple liquid-foam sloshing system as prototype, we demonstrate that nonlinear friction effects, resulting from the multiscale nature of moving contact lines, become predominant at low amplitude and result in a finite-time arrest of the oscillations. This result is in strong contrast with the classical exponential relaxation induced by linear damping. We proceed to derive a model for the oscillation of foam in a cylinder accounting for capillary effects near the container walls, which we solve using multiple scales analysis. These results help rationalize our experimental observations and reveal the importance of sublinear effects in perturbation theory.

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Francois Gallaire
Laboratory of Fluid Mechanics and Instabilities,
STI, EPFL, Lausanne, Switzerland

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