Abstract Submitted
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Hydraulic jumps in the liquid foam microchannels CHRISTOPHE RAUFASTE, ALEXANDRE COHEN, NATHALIE FRAYSSE, JEAN RAJCHENBACH, YANN BOURET, MEDERIC ARGENTINA, Universite Cote d'Azur — Plateau borders (PBs) are the liquid microchannels found at the intersection between three bubbles in liquid foams. They form an interconnected network that plays a major role in foam drainage and stability properties. Each channel has an unbounded geometry but is not subject to the Rayleigh-Plateau instability. This stability is accounted for by an effective negative surface tension (Gminard et al., 2004). We show that their relaxation dynamics can trigger inertial flows characterized by strongly nonlinear features. An experimental setup was designed to study the response of a PB to a liquid perturbation. Extra liquid is injected into the PB by drop coalescence. Depending on the parameters, either a viscous flow or an inertial one is observed. For the latter, the relaxation takes the form of a hydraulic jump, which propagates at a velocity around 0.1-1 m/s. Solitons are also observed for another type of perturbation. The PB dynamics is modeled and its equation presents an analogy with the differential equation of mechanical nonlinear oscillators.

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