

Liquid foam: Plastic, elastic and fluid

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What differentiates complex fluids from mere fluids? What makes them unique is that they are neither solid nor liquid. Among such complex fluids are foams. They are used as a model to understand the mechanisms underlying complex fluids flow. Now, a team of French physicists has gained new insights into predicting how complex fluids react under stretching conditions due to the interplay between elasticity, plasticity and flow. These findings were recently published in *EPJ E* by Benjamin Dollet and Claire Bocher from the Rennes Institute of Physics, in Brittany, France. Ultimately, potential applications include the design of new, optimised acoustic insulators based on liquid forms, or the mitigation of blast waves caused by explosions.

In this study, the authors study foam [flow](#) in a wedge-shaped channel,

where the bubbles are in a monolayer and therefore easy to visualise. The choice of a wedge structure as a type of confined space is a novel one not previously examined.

Its advantage is that it is simple enough to automatically measure important features such as elongated flow and elastic deformation, as well as plastic events like swapping of neighbouring bubbles. The study was performed in the two main modes of deformation of any material, namely through sideways, or shear deformation, and through elongation. This, in turn, made it possible to compare such flows to some simple models.

As the main new results, Dollet and his colleague quantified for the first time the connection between plastic events and the foam deformation rate. They also experimentally identified a coupling between elastic stresses and the foam deformation rate.

Better understanding [foam](#) characteristics could, ultimately, help us to further investigate how [liquid](#) foams absorb mechanical energy, i.e., through experiments on acoustical propagation and shock wave propagation in liquid foams.

More information: Benjamin Dollet et al. Flow of foam through a convergent channel, *The European Physical Journal E* (2015). [DOI: 10.1140/epje/i2015-15123-3](#)

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