

Bubble-scale modelling of flowing foams

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Foams are found in many situations: industrially they are used in oil extraction from porous media and for ore separation in mining, while domestically they are important in foods and cosmetic products. Being able to predict their behaviour under a given perturbation stimulates improved efficiency of industrial processes and the possibility to relate chemical formulation to rheology and hence to consumer satisfaction.

Foam structure is disordered but not disorganized. I will describe the bubble-scale structure, and show how it can be used as the basis for modelling the flow of foams in a number of scenarios. In particular, I will give examples of shear flows, particle sedimentation and the emerging field of discrete microfluidics in which foams are confined within narrow channels. In all these cases, correctly modelling the dissipation mechanisms while retaining the precise structural details is important in accurately predicting the material response.