non-linear viscoelasticity and wall slip regimes of aqueous foams

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Foams : striking rheological properties

Foams = dispersion of gas into a liquid, stabilized by molecules adsorbed at



Shearing foams ? an everyday life experience (food, cosmetics, detergency...)

> As the deformation is increased : First elastic behavior, then plastic behavior with irreversible bubble rearrangements and finally the foam flows like a viscous liquid

> > A visco-elasto-plastic material ; though a foam is mostly made of gas

Experimental setup : rheometry coupled to Diffusive Wave Spectroscopy (DWS)



Foam parameters investigated:

 \bigcirc Liquid fraction, ε :







are varied simultaneously and inversely.

Our foam data can be compared to other systems and models by using

normalized stress, σ' : stress divided by the Laplace pressure, (Γ/R)

slip velocity is transposed in Capillary number $Ca = \mu V/\Gamma$

non-dimensional quantities :

dependence of F_i with shear rate : $\gamma_c = 0.25 = a$ correct value.

Steady-shear results with smooth surfaces : study of surface slip for 3D foams

Strong effect of the bottom plate roughness : stress σ vs shear rate

