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Biextensional viscosity and non stationary elastocapillarity effects in the Impact of viscoelastic drops

When a drop of a viscoelastic fluid hits a solid surface , in minimal dissipations conditions, (achieved using either a small solid target or a repellent surface), it expands radially until reaching a maximum diameter and subsequently recedes. Experiments indicate the presence of two expansion regimes: the capillary regime, where the maximum expansion does not depend on the fluid's zero-shear viscosity, and the viscous regime, where the expansion is reduced with increasing zero-shear viscosity due to viscous dissipation. Two classes of viscoelastic fluids have been investigated: (i) Thinning fluids consisting of solutions of living polymers of various concentration, and (ii) ultra soft self-assembled transient networks, with tunable elastic modulus and relaxation time.

In the viscous regime,we we find that the *equibiaxial* viscosity is the appropriate quantity to describe the maximum expansion of both viscoelastic and viscous sheets. For solutions of viscoelastic thinning fluids, shear dissipation is negligible compared to extensional dissipation.

In the capillary regime, the impact experiment allows to evidence a *Deborah-dependent* modulation of the variation of the maximum expansion with impact velocity, that we interpret as a non-stationary elasto-capillarity phenomenon.