

Wetting of yield-stress fluids

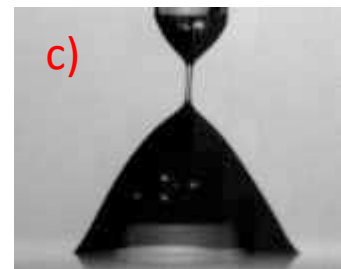
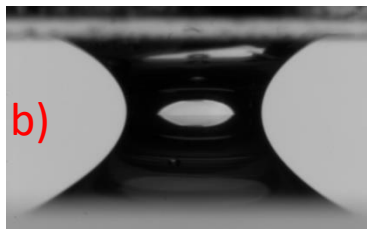
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Yield-stress fluids such as emulsions, suspensions, gels or foams exhibit interesting mechanical properties depending on the applied stress. Indeed they behave like an elastic below a critical stress called "yield stress" and flow like a liquid above it. This intermediate behavior solid/liquid makes them particularly interesting for applications (food industry, cosmetics, building industry), but fundamentally difficult to describe.

In this seminar, I will study the wetting properties of yield stress fluids by performing three capillary experiments: a) capillary rise [1] , b) adhesion due to a capillary bridge [2] and c) spreading of a drop of a yield-stress fluid [3]. In the case of simple fluids, such experiments are classical and the wetting laws (Jurin's law or Young law) are well known.

Here I will study the influence of the yield stress on the final capillary rise or on the final contact angle. I will also show the strong impact of the dynamic history and of the boundary conditions [4]. More importantly, I will show that exploring the competition between surface tension, which is an equilibrium property, and yield stress effects that often keep the system out of thermodynamic equilibrium due to a dynamic arrest is possible as soon as force balances are performed.



Ref.:

- [1] B. Géraud et al. , Eur. Phys. Letters, v 107, 58002 (2014).
- [2] L. Jorgensen et al., Soft Matter, v 11, 5111 (2015)
- [3] G. Martouzet et al., Phys Rev Fluids, accepted (2021)
- [4] J. Péméja et al., Phys. Rev. Fluids, v4, 033301 (2019)