

Gradient Dynamics Model for Spreading Drops on soft Substrates

Tuesday, 29 June 2021 11:35 (25 minutes)

The wetting behaviour of liquids on viscoelastic or elastic substrates is of great interest as it is relevant in many applications. Here, we present a simple model for partially or completely wetting liquids on fully compressible elastic substrates. It is shown that the model faithfully captures not only the double transition of steady drops (with increasing softness), but also features of dynamic processes. We focus on the example of a spreading drop on soft substrates and consider the effect of viscoelastic braking, i.e. the increase of dissipation in the substrate with increasing softness. Furthermore we show that the scaling laws of a Kelvin-Voigt material [1] are correctly recovered for partially wetting liquids and indicates that the behaviour crucially changes in the case of complete wetting.

[1] S. Karpitschka, S. Das, M. van Gorcum, H. Perrin, B. Andreotti, and J. H. Snoeijer. Droplets move over viscoelastic substrates by surfing a ridge. *Nat. Commun.*, 6:7891, 2015. doi:10.1038/ncomms8891

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Session Classification: Soft Substrates Session