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Laws of spreading: When hydrodynamic equations are not enough PIROUZ KAVEHPOUR, ALIREZA MOHAMMAD KARIM, University of California, Los Angeles, JONATHAN ROTHSTEIN, University of Massachusetts, Amherst, STEPHEN DAVIS, Northwestern University — For nearly 50 years, most of the researchers in the area of wetting and spreading have used a relationship between the dynamics contact angle and velocity and the equilibrium contact angle. Different forms of this relationship are known as Tanner's law, Hoffman-Voinov-Tanner law or Cox model, all of them are derived based on hydrodynamics assumptions. In this talk, we will discuss several common situations that this relationship is not valid and we propose a new way to look at spreading problem and its underlying physics. Our experimental result agrees with this interpretation of spreading dynamics. In addition, the experimental study has been performed using forced spreading with tensiometer to obtain the dependence of dynamic contact angle to the contact line velocity to describe the spreading dynamics of Newtonian liquids on the micro-textured surfaces. The effect of the geometrical descriptions of the micro-posts along with the physical properties of liquids on the spreading dynamics on micro-textured Teflon plates have been also studied. It was shown that hydrodynamic results are not valid for certain combination of fluid/solid systems.

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