Contribution ID: **19** Type: **Talk**

Steering droplets on substrates with plane-wave wettability patterns and deformations

Wednesday, 7 December 2022 17:00 (30 minutes)

Droplets are set in motion on substrates with a spatio-temporal wettability pattern as generated, for example, on light-switchable surfaces. To study such cases, we implement the boundary-element method to solve the governing Stokes equations for the fluid flow field inside and on the surface of a droplet and supplement it by Cox–Voinov friction for the dynamics of the contact line. One objective of our research is targeted microfluidic transport of such droplets. In earlier work we investigated how a droplet can be steered by controlling its substrate's wettability pattern [Grawitter and Stark, Soft Matter **17**, 2454 (2021)]. As a next step, we have recently extended our method to include substrates the height profile of which varies temporally in a prescribed manner.

We compare two cases: First, we investigate a droplet on substrates with planar-wave-like wettability profile by varying the speed and wave length of the pattern. Second, we investigate a droplet on substrates which deform periodically according to a planar-wave profile. In both scenarios, when the profile moves slowly, it moves the droplet moves steadily forward. Above a critical pattern speed the droplet performs steady oscillations. These speed oscillations correspond to oscillations in the shape of the droplet which decay linearly as a functions of pattern speed.

Primary authors: GRAWITTER, Josua (Technische Universität Berlin, Institut für Theoretische Physik); Prof. STARK, Holger (Technische Universität Berlin, Insitut für Theoretische Physik)

Presenter: GRAWITTER, Josua (Technische Universität Berlin, Institut für Theoretische Physik)

Session Classification: Short Talks