

Gradient dynamics model for sessile drop evaporation in a gap: from simple to applied scenarios

Donnerstag, 8. Dezember 2022 12:00 (30 Minuten)

We consider an evaporating drop of volatile partially wetting liquid on a rigid solid substrate.

In addition, the setup is covered with a plate, forming a narrow gap with the substrate.

First, we develop an efficient mesoscopic description of the liquid and vapor dynamics in a gradient dynamics form.

It couples the diffusive dynamics of the vertically averaged vapour density in the narrow gap to an evolution equation for the drop profile.

The dynamics is purely driven by a free energy functional that incorporates wetting, bulk and interface energies of the liquid as well as vapour entropy.

Subsequently, we employ numerical simulations to validate the model against both experiments and simulations based on Stokes equation.

Finally, we show that the gradient dynamics approach allows for extensions of our model to cover more intricate scenarios, e.g., spreading drops of volatile liquid on polymer brushes or on porous media.

Primary authors: HARTMANN, Simon; THIELE, Uwe (WWU Münster); DIDDENS, Christian (University of Twente); JALAAL, Mazyar (University of Amsterdam)

Vortragende(r): HARTMANN, Simon

Sitzung Einordnung: Short Talks