

Abstract for Droplets 2015

The lifetimes of evaporating droplets

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This talk reports on joint work with Ms Jutta M. Stauber and Dr Brian R. Duffy (University of Strathclyde) and Professor Khellil Sefiane (University of Edinburgh).

As the recent explosion of research activity shows, there is currently considerable worldwide interest in the evaporation of sessile droplets. However, until now there has been relatively little interest in the lifetimes of evaporating droplets.

The lifetime of an evaporating droplet depends on the manner in which it evaporates. There are various qualitatively different modes of droplet evaporation, of which the most extreme are the constant radius mode (in which the contact line is always pinned) and the constant angle mode (in which the contact angle always takes its initial value), and probably the most commonly occurring is the so-called stick-slide mode (in which the droplet initially evaporates in a constant radius phase until the contact angle reaches the receding contact angle, and thereafter the contact line de-pins and the droplet evaporates in a constant angle phase). Other modes of evaporation, such as the so-called stick-jump mode (in which the droplet undergoes a series of rapid jumps between pinned states with decreasingly small contact radius), can also occur.

In this talk we describe some of the recent advances in the theoretical description of the lifetimes of droplets evaporating in various modes, and indicate directions for possible future studies.

Many of the details of the work described in this talk are given in references [1]–[4], and the references therein.

[1] Stauber, J.M., Wilson, S.K., Duffy, B.R., Sefiane, K., On the lifetimes of evaporating droplets, *J. Fluid Mech.* **744** R2 (2014)

[2] Stauber, J.M., Wilson, S.K., Duffy, B.R., Sefiane, K., Evaporation of droplets on strongly hydrophobic substrates, *Langmuir* **31** (12) 3653–3660 (2015)

[3] Stauber, J.M., Wilson, S.K., Duffy, B.R., Sefiane, K., On the lifetimes of evaporating droplets with related initial and receding contact angles, submitted for publication

[4] Stauber, J.M., On the evaporation of sessile droplets, Ph D thesis, University of Strathclyde, Glasgow (2015)