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Controlling evaporating droplets MICHAEL EWETOLA, MARC PRADAS, The Open University, UK — Controlling the dynamics of evaporating liquid droplets is important in several industrial applications such as coating, and inkjet printing. In this talk the behaviour of a two-dimensional droplet that is slowly evaporating on a solid surface due to mass diffusion is investigated. The substrate is flat but with smooth chemical variations that lead to a space-dependent local contact angle. Detailed bifurcation analysis of the equilibrium properties of the droplet as its size is changed, reveals the emergence of a hierarchy of bifurcations that strongly depends on the particular underlying chemical pattern. Symmetric and periodic patterns lead to a sequence of pitchfork and saddle-node bifurcations that make stable solutions to become saddle nodes. Under dynamic conditions, this change in stability suggests that any perturbation in the system can make the droplet to shift laterally while relaxing to the nearest stable point. With an asymmetric periodic chemical variation, it is shown that the droplet can be made to move in certain directions as is confirmed by numerical computations of the Cahn-Hilliard and Navier-Stokes system of equations.

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