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Pinning, retraction and terracing of evaporating droplets containing nanoparticles OMAR MATAR, RICHARD CRASTER, Imperial College London, KHELLIL SEFIANE, University of Edinburgh — We consider the dynamics of a slender, evaporating droplet containing nanoparticles. We use lubrication theory to derive a coupled system of equations that govern the film thickness and the concentration of nanoparticles. These equations account for capillarity, Marangoni stresses, evaporation and disjoining pressure; the nanoparticles-induced structural component of the disjoining pressure is also considered. Contact line singularities are avoided through the adsorption of ultra-thin films wherein evaporation is suppressed by the disjoining pressure; a similar approach has recently been used by Ajaev, who has built on the previous work of Moosman and Homsy. The results of our numerical simulations indicate that, depending on the value of system parameters, the droplet exhibits a variety of different behaviours, which include spreading, evaporation- driven retraction, contact line pinning, and "terrace"- formation.

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