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Relaxation of contact-line singularities solely by the Kelvin effect and apparent contact angles for isothermal volatile liquids in contact with air[1] ALEXEY REDNIKOV, PIERRE COLINET, Universite Libre de Bruxelles - TIPs, CP 165/67 — The contact (triple) line of a volatile liquid on a flat solid is studied theoretically. Like with a pure-vapor atmosphere [Phys. Rev. E 87, 010401, 2013], but here for isothermal diffusion-limited evaporation/condensation in the presence of an inert gas, we rigorously show that the notorious contact-line singularities (related to motion or phase change itself) can be regularized solely on account of the Kelvin effect (curvature dependence of the saturation conditions). No disjoining pressure, precursor films or Navier slip are in fact needed to this purpose, and nor are they taken into consideration here ("minimalist" approach). The model applies to both perfect (zero Young's angle) and partial wetting, and is in particular used to study the related issue of evaporation-induced contact angles. Their modification by the contact-line motion (either advancing or receding) is assessed. The formulation is posed for a distinguished immediate vicinity of the contact line (the "microregion"), the corresponding problem decoupling to leading order, here up to one unknown coefficient, from what actually happens at the macroscale. The lubrication approximation (implying sufficiently small contact angles) is used in the liquid, coupled with the diffusion equation in the gaz phase.

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