Abstract Submitted
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Influence of evaporation on a thin binary liquid film flowing down a heated inclined plate[1] JUTHAMAS KAMRAK, BENOIT SCHEID, PIERRE COLINET, Universite Libre de Bruxelles-TIPs (Transfers, Interfaces and Processes) — We investigate the evolution of a two-component liquid film (here consisting of glycerine in water) falling down a heated plate, while water evaporates (glycerine is assumed to be non-volatile). The liquid phase is separated from pure water vapour by a deformable interface. We study the influence of both heat and mass transfer on the evolution of the liquid film. The temperature and concentration variations due to the evaporation of the solvent induce thermal and solutal Marangoni stresses on the free surface, thus affecting the evolution of the film. The mathematical model is developed by combining the lubrication theory with a weighted residuals approach. We obtain a set of coupled equations for the evolution of the film thickness, the velocity, the temperature and the concentration fields, at first-order. Stationary solutions are then calculated for different control parameters and show an intricate dependence of the different variables in the transition region where the evaporation flux reaches its maximum.

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