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Rivulet patterns in heated falling films up to moderate Reynolds numbers. BENOIT SCHEID, Université Libre de Bruxelles, SERAFIM KALLIADASIS, Imperial College, London, CHRISTIAN RUYER-QUIL, CNRS UMR 7608, Paris, PIERRE COLINET, Université Libre de Bruxelles — Three-dimensional wave patterns on a film flowing down a uniformly heated wall are investigated. Combining a gradient expansion with a Galerkin method, a model of four evolution equations for the film thickness, the surface temperature and both the streamwise and spanwise flow rates is shown to be robust and accurate in describing the competition between hydrodynamic waves and thermocapillary effects in a large range parameters. For small Reynolds number, *i.e.* in the drag-gravity regime, regularly spaced rivulets are observed, aligned with the flow and fostering quasi-two-dimensional waves of larger amplitude and phase speed than those observed in isothermal conditions. For larger Reynolds number, *i.e.* in the drag-inertia regime, the picture is similar to the isothermal case and no rivulets are observed. The transition between these two situations shows complex cooperative behaviors between both hydrodynamic and thermocapillary modes. Additionally, this transition is found to be related to the variations of amplitude and speed of the spanwise independent solitary wave solutions to the model.

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