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Numerical studies of film formation in context of steel coating. WOJCIECH ANISZEWSKI, STEPHANE ZALESKI, STEPHANE POPINET, University of Pierre and Marie Curie (Paris 6) — In this work, we present a detailed example of numerical study of film formation in the context of metal coating. Liquid metal is drawn from a reservoir onto a retracting solid sheet, forming a coating film characterized by phenomena such as longitudinal thickness variation (in 3D) or waves akin to that predicted by Kapitza and Kapitza (visible in two dimensions as well). While the industry standard configuration for Zinc coating is marked by coexistence of medium Capillary number (Ca= 0.03) and film Reynolds number above 1000, we present also parametric studies in order to establish more clearly to what degree does the numerical method influence film regimes obtained in the target configuration. The simulations have been performed using Basilisk, a grid-adapting, strongly optimized code derived from Gerris. Mesh adaptation allows for arbitrary precision in relevant regions such as the contact line or the meniscus, while a coarse grid is applied elsewhere. This adaptation strategy, as the results indicate, is the only realistic approach for numerical method to cover the wide range of necessary scales from the predicted film thickness (hundreds of microns) to the domain size (meters).

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