

Dynamics of Simplified Slide Coating

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Slide coating process is widely used for precision coating, especially for multilayer coating. It has been mainly investigated by flow visualization techniques and by theoretical modeling using Navier–Stokes equation system for viscous free surface flow. In this study, we have developed and tested a simplified viscocapillary modeling for slide coating. It rests on one-dimensional equations for the film thickness in flow down a slide and the coating thickness at the moving web, derived by the integral momentum balance approach of Higgins and Scriven (1979) and Kistler (1983). The equations are solved in finite difference approximation by Newton iteration with continuation. The results show how inertia (Reynolds number), surface tension (capillary number), inclination angles of the slide and the moving web, and the web speed affect film thickness profiles. How accurate and valuable the simplified modeling will be examined.