Comparison of 1D and 2D Curtain Coating Flows

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In the curtain coating, liquid curtain that falls freely before impinging on the substrate is subject to more instabilities, for example, the periodic oscillations in viscous curtain, and is more susceptible to external disturbances, air pressure and substrate speed for example, than other coating methods. Thus, computer-aided theoretical modeling is valuable in understanding, predicting, and controlling the curtain behavior. In this study, flow dynamics and stability of simplified curtain flow have been investigated. Effects of process conditions such as Reynolds number, capillary number, air pressure difference, etc. on the process stability and sensitivity have been fully examined. Also, how accurate and valuable the simplified model will be has been investigated by comparing results of both simplified 1D and 2D models.