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Dynamics and Operability Windows of Slot Coating Process

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Abstract

Slot coating as one of the pre-metered coating methods has been applied for the many precise coating products. However, manufacturing such uniform coating products is not a trivial task at high-speed operations because many flow instabilities or defects such as leaking, entrained air bubbles, ribbing, rivulets, etc. are frequently observed in this process. It is no wonder, therefore, that many efforts to understand the various aspects of the dynamics and coating windows of this process have been made both in academia and industry. In this study, flow dynamics within the coating bead in single layer slot coating process has been investigated using the one-dimensional viscocapillary model by lubrication approximation and two-dimensional Flow-3D software. Especially, operability windows in both 1D and 2D cases with various slot die geometries have been successfully portrayed, quantitatively corroborating the experimental results.