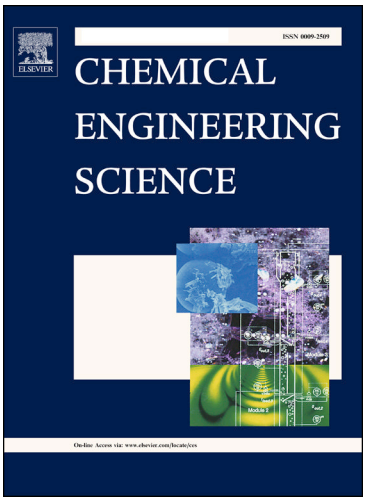

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Dynamics of thin liquid films flowing down the non-isothermal cylinder with wall slippage

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Abstract

Coating liquid films on cylinders occurs widely in nature, material sciences, and industrial processes. A typical example is the fabrication of thin solid films, which could be achieved by drawing the heated cylinder from the liquid pool and followed by a drying process. However, in some cases, the surface of the coated cylinder is actually not smooth and exhibits hydrophobicity where the slip effect may come into play. Therefore, in this paper, we study the dynamics of thin liquid films flowing down the non-isothermal (uniformly heated or cooled) cylinder in the presence of wall slippage. The thermocapillary and slip effects on the thin film flows are examined by a thin film model. Linear stability analysis (LSA) indicates that when the cylinder is heated, thermocapillary effect enhances the Rayleigh-Plateau instability, while when the cylinder is cooled, thermocapillary effect suppresses this instability. However, we find that wall slippage always promotes the capillary instability, and

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