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Influence of the contact line velocity on the finger formation of the liquid film expanding on an inclined plate MASATOSHI YAMASHITA, MASATO NISHIKAWA, TAKAHIRO ITO, YOSHIYUKI TSUJI, Nagoya University — When a liquid film flows down on an inclined solid surface, the contact line can be destabilized to finger shape. This phenomenon leads to the non-uniform height of the liquid surface or even to generation of dry patch, and then has a great effect on cooling of energy device and quality of coating. In previous studies, the final finger shapes have been discussed by relating the with capillary (Ca) number and the wetting properties of the liquid for the solid substrate, i.e. the contact angle. However, in the experimental studies, little attention has been paid on the difference between the static contact angle and the dynamic one, the latter which is actually observed when the finger is developing. In this study, we performed three-dimensional measurement of surface geometry of the liquid film to clarify how the dynamic contact angles and the Ca number influence the finger shape by optical method. We observed two different finger shapes depending on the volumes of the working fluid., and verified that the finger shapes depend on the contact angle scaled by Ca number. We found that the local dynamic contact angle and the contact line velocity on the trough part of the wavy contact line can be highly related with the final finger shape.

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