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Parametric Study of the Wetting Transition of a Moving Meniscus.[1] JIHOON KIM, Korea Institute of Ocean Science and Technology, JIN HWAN KO, Jeju National University, HEUNGCHAN KIM, HWAJUN LEE, Korea Institute of Ocean Science and Technology — In this study, we investigated the wetting transition of a moving meniscus in a grooved microchannel through a detailed parametric study based on measurement by an optical tool and micro-particle image velocimetry to avoid the transition in designing the microchannel. The parameters investigated were pitch, flow rate, and height of a microchannel. The contact angle, contact speed, and interfacial pressure difference were analyzed according to the parameters. We found that the pitch is most effective, the flow rate is moderately effective, and the height is least effective on that. The height even does not affect the contact angle because the solid-fluid interaction at the groove edge is stronger than the fluid-air interaction. As the critical correlation, the contact angle, which is dependent on the pitch and the flow rate, and the height affect the air pressure between the grooves, which governs the air penetration flux and mainly determines the wetting transition. Therefore, a powerful way to delay the wetting transition is to reduce the degree of air pressure variation, specifically with a low pitch and a tall height with a low flow rate. Eventually, understanding dominant input parameters in relation to the wetting transition will be very useful in the design stage of microfluidic applications.

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