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Criterion of wetting failure in a Couette flow[1] PENG GAO, Department of Modern Mechanics, University of Science and Technology of China — Wetting failure occurs when the speed of the moving substrate exceeds a threshold, characterized by a critical Capillary number, above which the stationary contact line cannot be sustained. In most experimental and theoretical studies, it is found that the onset of wetting failure is accompanied by a geometry constraint that the apparent contact angle vanishes. In a Couette device, however, it is reported that wetting failure occurs at nonzero apparent contact angles. Using a lubrication theory, we investigate the contact dynamics in a Couette flow. The critical Capillary number is predicted. It is suggested that the criterion of vanishing apparent contact angle still holds if it is well defined.

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