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The effect of flow field/geometry on the dynamic contact angle ALEX LUKIYANOV, University of Reading, YULII SHIKHMURZAEV, University of Birmingham — A number of recent experiments suggest that, at a given wetting speed, the dynamic contact angle formed by an advancing liquid-gas interface with a solid substrate depends on the flow field/geometry near the moving contact line. In the present work, this effect is investigated in the framework of an earlier developed theory which was based on the fact that dynamic wetting is, by its very name, a process of formation of a new/fresh liquid-solid interface and hence should be considered not as a one-off problem but as a particular case from a general class of flows with forming or/and disappearing interfaces. The results demonstrate that in the flow configuration of curtain coating the actual dynamic contact angle indeed depends not only on the wetting speed and material constants of the contacting media, as in the so-called 'slip models', but also on the inlet velocity of the curtain, its height and the angle between the falling curtain and the solid surface. In other words, for the same wetting speed the dynamic contact angle can be varied by manipulating the flow field/geometry near the moving contact line. The obtained results have important experimental implications: one can use the overall flow conditions and the contact angle as a macroscopic multiparametric 'signal-response' pair that probes the dynamics of the liquid-solid interface. This approach would allow one to investigate experimentally such properties of the interface as, for example, its equation of state, the rheological properties involved in the interface's response to an external torque, and help to measure its parameters, such as the coefficient of sliding friction, etc.

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