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Inertial effects on the flow near a moving contact line AKHIL VARMA[1], ANUBHAB ROY, BABURAJ PUTHENVEETTIL, Indian Institute of Technology Madras — Wetting phenomenon involves the motion of a liquid interface over a solid surface, characterized by a moving contact line; sliding drops and dip coating processes are some classic examples. While the traditional approach to model the flow near a contact line is to neglect inertia and assume Stokes flow, we show that this is inadequate to accurately describe the flow near fast-moving contact lines, where the flow lies in the visco-inertial regime. To this end, we implement the classical regular perturbation approach to determine the higher-order inertial corrections to the Stokes flow near a moving, straight contact line. We then pay particular attention to the influence of inertia on the flow velocity at the liquid interface. Furthermore, we formally show that at small length scales where the contact line physics become important, the inertial effects are negligible, and hence unlikely to affect the dynamic contact angle models. The analysis presents additional theoretical challenges in determining the solution at a few critical contact angles where modified, non-singular expressions are warranted, which we determine from first principles.

[1](Not affiliated at present)

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None

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