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The drag-reducing ingredients of superhydrophobic surfaces[1]
YIXUAN LI, KRISHNAN MAHESH, University of Minnesota — The drag–reducing ingredients of superhydrophobic surfaces are studied for laminar and turbulent channel flow. Direct numerical simulation is used to examine the effects of micro–structure geometry and the state of the air–water interface, on drag reduction. Fully wetted simulations of the flow show how geometry alone yields an apparent slip to the external flow. An alternative to the commonly used zero–shear boundary condition is suggested for simulation of the interface. The amount of captured air is varied and its effect on net drag is quantified. The effect of meniscus curvature is considered and its effect on the flow is quantified. A local measure is introduced to examine the extent to which the flow inside the channel is affected.

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