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Superhydrophobic Drag Reduction[1]

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Superhydrophobic surfaces combine hydrophobic surface chemistry with surface roughness at the micron scale. The result is free-surface contact angles in excess of 170 degrees and drag reduction of boundary layers next to these surfaces. Both the laminar and turbulent drag reduction mechanisms are discussed in this presentation. Direct numerical simulations of turbulent channel flow are used to investigate the turbulent drag reduction dynamics, slip velocities, wall shear stresses, and Reynolds stresses for a variety of superhydrophobic surface micro-features, and geometry configurations, at friction Reynolds numbers of 180, 395, and 590. It is shown that in the turbulent regime these surfaces can be modeled well as "anti-rough" surfaces.

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