

The Superhydrophobic Surface Effect on Laminar Boundary Layer Flows

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Abstract : This study investigates the fluid of boundary layer flow as it flows through the superhydrophobic surface. The superhydrophobic surface will be assembled into an observation channel for fluid experiments. The fluid in the channel will be doped with visual flow field particles, which will then be pumped by the syringe pump and introduced into the experimentally observed channel through the pipeline. Through the polarized light irradiation, the movement of the particles in the channel is captured by a high-speed camera, and the velocity of the particles is analyzed by MATLAB to find out the particle velocity field changes caused on the fluid boundary layer. This study found that the superhydrophobic surface can effectively increase the velocity near the wall surface, and the faster with the flow rate increases. The superhydrophobic surface also had longer the slip length compared with the plan surface. In the calculation of the drag coefficient, the superhydrophobic surface produces a lower drag coefficient, and there is a more significant difference when the Re reduced in the flow field.

Keywords : hydrophobic, boundary layer, slip length, friction

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