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Effect of superhydrophobic surfaces on the flow over a hydrofoil at low Reynolds number[1] HYUNSEOK KIM, NAYOUNG KIM, HYUNGMIN PARK, Seoul National University — In the present study, we experimentally investigate the effect of superhydrophobic surface on the flow over a hydrofoil at low $Re_c < 10^4$, where c is the chord length of a hydrofoil. As a hydrofoil, we consider the cross-sections typically used for airfoils like NACA0012, NACA0024, and NACA4412, which stand for thin, thick and cambered hydrofoils, respectively. Spray-coating of hydrophobic nanoparticles are applied onto the hydrofoil surface and subsequent velocity fields are measured in a water tunnel using two-dimensional particle image velocimetry at different angles of attack, $\alpha = 0^\circ - 20^\circ$. At small α's (for example, less than 10°), it is found that the surface slip tends to affect the flow separation slightly and also modify the size of recirculation region in the wake. Since a massive separation occurs at the leading edge at larger α's, however, the effect of superhydrophobic surface becomes diminished. In the talk, the dependence of the hydrodynamic role of surface slip on the hydrofoil shape and Re_c will be presented.

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Hyunseok Kim
Seoul National University

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