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Effect of angle of obliquely aligned superhydrophobic surface on drag-reducing performance in turbulent channel flow HIROYA MAMORI, Tokyo University of Science, SHO WATANABE, KOJI FUKAGATA, Keio University — Direct numerical simulation of a turbulent channel flow with superhydrophobic surfaces is performed to investigate friction drag reduction effect. All simulations are performed under a constant pressure gradient and the friction Reynolds number is set to be 180. Especially, we focus on the influence of the angle of microridge structure to flow direction. The gas area fraction on the surface is kept at 50% and the groove width is kept constant at 33.75 wall units. When the microridge is parallel to the flow, the bulk mean velocity is increased about 15% which corresponds the skin-friction drag reduction effect. As increasing the microridge angle, the drag reduction effect is found to deteriorate rapidly due to a decrease in the slip velocity. We also perform the analysis for the Reynolds stress budgets and found that the modification in each physical effect is qualitatively similar for different angle cases, but it is more pronounced if the microridge is aligned with the stream.

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