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Prediction and Control of Turbulent Separation Over a Wall-Mounted Hump[1] DONGHYUN YOU, MENG WANG, PARVIZ MOIN, Center for Turbulence Research, Stanford University — In recent years control methods employing synthetic jets, or zero-net-mass-flux oscillatory jets, have shown good promise for controlling flow separation in industrial applications. The flow fields under control are typically complex and involve a wide range of spatial and temporal scales. In this study, we use LES to predict the flow over a wall-mounted hump at Reynolds number of 9.75×10^5 based on the hump chord length (Test Case 3 in 2004 NASA Langley Workshop on CFD Validation of Synthetic Jets and Separation Control). A small slot across the entire span is used to produce either steady suction or sinusoidal suction/blowing. The model synthetic jet actuator is shown to be effective in suppressing flow separation. The flow solutions for both controlled and uncontrolled cases show excellent agreement with experimental data and are much more accurate than those obtained using RANS methods.

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