Abstract Submitted
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Turbulence characteristics of separated boundary layer flow under unsteady pressure gradients using direct numerical simulation[1] JUNSHIN PARK, Department of Mechanical Engineering, Pohang University of Science and Technology, WILLIAM BROMBY, DONGHYUN YOU, Department of Mechanical Engineering, Carnegie Mellon University — To understand turbulence characteristics of separated boundary layer flow under unsteady pressure gradients, a direct numerical simulation study is performed. Steady and unsteady blowing-suction velocity distributions are imposed along the upper boundary of the computational domain to introduce steady and unsteady adverse pressure gradients leading to steady and unsteady separated turbulent boundary layers, respectively. Time averaged and phase averaged turbulence statistics such as velocity, vorticity, kinetic energy budgets, Reynolds stress budgets, wall pressure fluctuations and skin friction distributions are examined in detail with aims of gaining understanding of flow physics for unsteady separated turbulent boundary layer and the sources of incapability of the conventional Reynolds-averaged Navier-Stokes models in predicting unsteady separation.

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