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Generating Unsteady Pressure Gradients Using Rapidly Deforming Surface AADHY PARTHASARATHY, THERESA SAXTON-FOX, University of Illinois at Urbana-Champaign — This study demonstrates the capabilities of an experimental facility constructed to impose dynamic pressure gradients on the flow. A rapidly deforming ceiling causes a dynamically strengthening favourable and adverse pressure gradient in sequence. Curvature of the ceiling is characterised in an instantaneous manner by using a high-speed camera, along with the corresponding spatial variation of the strength of FPG and APG imposed. The maximum speed of deformation of the ceiling is 1 m/s, and the acceleration parameter, K, at the section at the point of maximum deformation ranges between 2.5×10^{-6} and 8.5×10^{-6}. Time-resolved planar Particle Image Velocimetry is used to investigate the behaviour of the flow over and around the deforming ceiling. The different geometric and dynamic conditions tested will allow investigation of the effect of dynamic pressure gradients on the behaviour of turbulent boundary layers.

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