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Zero Pressure Gradient Turbulent Boundary Layer Response to a Spatially Impulsive Dynamic Roughness JEFFREY LEHEW, IAN JACOBI, BEVERLEY MCKEON, California Institute of Technology — The effect of a surface with a temporally actuated, spatially impulsive patch of roughness on a zero pressure gradient turbulent boundary layer is experimentally studied. This study is of potential interest for flow control applications and for understanding the effect that this additional roughness time scale has on turbulent boundary layers, specifically how it influences the relaxation of a turbulent boundary layer back to equilibrium after encountering the roughness. The time varying surface topology of the roughness is characterized using a scanning laser displacement sensor with phase locking capabilities. Boundary layer profiles are taken at downstream locations for a range of roughness excitation frequencies and amplitudes. Results are compared to smooth wall measurements as well as measurements made over similarly shaped static roughness elements.

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