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Control of turbulent shear flow structure using Lorentz force actuators MAUREEN MCCAMLEY, Brown University, CHARLES HENOCH, NUWC, KENNETH BREUER, Brown University — We present experimental results concerning the use of electro- hydrodynamic "Lorentz Force" actuators to affect the near- wall flow of a low Reynolds number fully turbulent channel flow. The actuators are used to induce an oscillatory motion near the surface, and their effect on the structure of the turbulent flow is measured using Particle Image Velocimetry. Previous results have shown that certain amplitude and frequency combinations are effective in suppressing the turbulent fluctuations, wall shear stress and Reynolds stresses. We extend these measurements with conditional sampling of velocity data and computation of two-point velocity correlations which indicate that the effect of forcing is to reduce the streamwise scale of the near-wall coherent structures and to sharply reduce the frequency of high- amplitude turbulence-producing "bursts". Measurements phase- locked to the forcing are also presented. Lastly, the relaxation of the controlled flow to its uncontrolled state following the removal of the actuation is discussed.

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