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Regimes of Flow Structures Generated by an Oscillating Fence in a Flat Plate Boundary Layer¹ MICHAEL HIND, JONATHAN NAUGHTON, WILLIAM LINDBERG, University of Wyoming — Oscillating fences are commonly used to control wall bounded flow by transferring high momentum fluid from the freestream into the boundary layer. Recent flow visualization studies on a laminar flat plate have shown that the coherent structures (vortices) generated by an oscillating fence can be classified into four regimes based on the ratio of the fence oscillation frequency to the natural shedding frequency of vortices from a static fence at the maximum oscillating fence height. Two- dimensional PIV is currently being used to quantify the vortex characteristics and refine the range of each flow regime. The PIV images are taken in a tow tank, with water as the working fluid, and are used to measure the following features: vortex shedding frequency, vortex strength, vortex advection speed, vortex dissipation rate, and effect of shed vortices on the boundary layer downstream of the oscillating fence. The static fence Strouhal number, based on vortex natural shedding frequency, fence height, and free-stream velocity, is ~ 0.2 and shows little variation over the range of experimental Reynolds numbers (200 -700, based on free-stream velocity and fence height).

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