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Vortex Interactions from a Finite Span Cylinder with a Laminar Boundary Layer for Varied Parameters[1] SAMANTHA GILDERSLEEVE, MICHAEL AMITAY, Rensselaer Polytech Inst — Flow structures around a stationary, wall-mounted, finite-span cylindrical pin were investigated experimentally over a flat plate to explore the effects of varied aspect ratio and pin mean height with respect to the local boundary layer. Nine static pin configurations were tested where the pin's mean height to the local boundary layer thickness were 0.5, 1, and 1.5 for a range of aspect ratios between 0.125 and 1.125. The freestream velocity was fixed at 11 m/s, corresponding to Re_D ˜2800, 5600, and 8400, respectively. Three-dimensional flowfields were reconstructed and analyzed from SPIV measurements where data were collected along cross-stream planes in the wake of the pin. This study focuses on three dominant vortical patterns associated with a finite span cylinder: the arch-type vortex horseshoe vortex, and the tip vortices Results indicate that both the aspect ratio and mean height play an important role in the behavior and interactions of these vortex structures which alter the wake characteristics significantly. Understanding the mechanisms by which the vortical structures may be strengthened while reducing adverse local pressure drag are key for developing more efficient means of passive and/or active flow control through finite span cylindrical pins and will be discussed in further detail.

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