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The Flow Field Downstream of a Dynamic Low Aspect Ratio Circular Cylinder: A Parametric Study[1] SAMANTHA GILDERSLEEVE, Rensselaer Polytechnic Institute, CLINGMAN DAN, The Boeing Company, MICHAEL AMITAY, Rensselaer Polytechnic Institute — Flow past a static, low aspect ratio cylinder (pin) has shown the formation of vortical structures, namely the horseshoe and arch-type vortex. These vortical structures may have substantial effects in controlling flow separation over airfoils. In the present experiments, the flow field associated with a low aspect ratio cylinder as it interacts with a laminar boundary layer under static and dynamic conditions was investigated through a parametric study over a flat plate. As a result of the pin being actuated in the wall-normal direction, the structures formed in the wake of the pin were seen to be a strong function of actuation amplitude, driving frequency, and aspect ratio of the cylinder. The study was conducted at a Reynolds number of 1875, based on the local boundary layer thickness, with a free stream velocity of 10 m/s. SPIV data were collected for two aspect ratios of 0.75 and 1.125, actuation amplitudes of 6.7% and 16.7%, and driving frequencies of 175 Hz and 350 Hz. Results indicate that the presence and interactions between vortical structures are altered in comparison to the static case and suggest increased large-scale mixing when the pin is driven at the shedding frequency (350 Hz).

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