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Reduction of vortex shedding intensity from a cylinder using semi-active flow control JARLE V. EKANGER, Flow Design Bureau AS, MORTEN KJELDSEN, NTNU — Experiments were performed in the open water channel at the Waterpower Laboratory, NTNU, Norway, with the aim of reducing vortex shedding intensity by semi-active flow control. The test rig consisted of a perforated steel tube lined by a rubber bellows. The holes (d/D=0.6) formed a line at the leading edge, one tube diameter apart. Two flow control modes were attainable; (1) lining being flush with the cylinder wall, and (2) pressurized lining creating leading edge bumps. Upstream flow conditions were monitored, and used as input for the control loop governing the pressure of the lining. A flat metal rod, onto which strain gauges were glued, was positioned in the wake. It was assumed that the motion of the rod corresponded to the velocity components normal to the main flow direction. Thus the motion of the rod described the vortex shedding from the tube. Strouhal numbers were found to be approximately 0.3. It was the assumption that the bumps would disrupt vortex formation and reduce the vortex intensity. Tests showed that the assumption was plausible, with observed intensity reductions of 15-30% for $\mathrm{Re}_D \sim$ [20000 to 50000]. Plots also appear to show a breakdown of organization in the wake when the tube is in activated mode. It was shown that semi-active control of vortex shedding behind a cylinder is achievable.

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