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Vortex-induced vibration of a curved cylinder BANAFSHEH SEYED-AGHAZADEH, COLLIN BUDZ, YAHYA MODARRES-SADEGHI, University of Massachusetts, Amherst — Vortex-induced vibration of a curved circular cylinder free to oscillate in the crossflow direction is studied experimentally. Both concave and convex orientations (with respect to the oncoming flow direction) were considered. The system had a mass ratio of 3.6 and a structural damping of 0.01. The amplitudes and frequencies of oscillations were measured in a Reynolds number range of Re=500-2700. It was found that the amplitude of oscillations in both configurations was decreased compared with a vertical cylinder with the same mass ratio. The lock-in range was also wider in both cases compared with the lock-in range of a vertical cylinder. Higher harmonic components in the crossflow force were observed in both cases. In the entire lock-in range, the crossflow displacement and force stayed in phase, however, the contribution of the higher harmonic force components became more significant at higher reduced velocities. Dye flow visualizations showed that the vortices were shed in parallel to the curved cylinder, when the cylinder was free to oscillate.

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