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The effect of boundary conditions on VIV of a fully submerged flexible cylinder MAHDIAR EDRAKI, University of Massachusetts, Amherst, BANAFSHEH SEYED-AGHAZADEH, Miami University, YAHYA MODARRES-SADEGHI, University of Massachusetts, Amherst — A series of experiments was conducted in a re-circulating water tunnel, in which Vortex-Induced Vibration (VIV) of a fully submerged, tension-dominated cylinder with different boundary conditions was studied. While in most previous studies, either the cylinder was not fully submerged in flow or the boundary conditions for the cylinder were different at the two ends, in the current study the cylinder is fully submerged and the boundary conditions are carefully controlled. The cylinder was held fixed at both ends and was placed perpendicular to the uniform incoming flow direction. Different symmetric and asymmetric boundary conditions for the cylinder, i.e., clamped-clamped, simply supported, and clamped-hinged were tested. Continuous response of the cylinder in both the crossflow and inline directions were reconstructed from limited number of measurement points based on modal expansion theorem modified using Modal Assurance Criterion (MAC). Amplitudes and frequencies of oscillations were studied in the reduced velocity range of U*= 5.5-32.5 and the Reynolds number range of Re = 200-1220. Modes up to four were excited in the crossflow direction for a cylinder with a length of L=0.3 m and an aspect ratio of 73.

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