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Harbor Seal Vibrissa Morphology Reduces Vortex-Induced Vibrations HEATHER BEEM, JASON DAHL, MICHAEL TRIANTAFYLLOU, Massachusetts Institute of Technology — Studies show that harbor seals are adept at tracking small movements in the water, such as those left in the wake of fish, by using their highly sensitive whiskers to detect fluid structures, even without auditory or visual cues. The present work investigates the intriguing claim that the unique morphology of the harbor seal whisker suppresses Vortex Induced Vibrations (VIV) [1]. This implies that the geometry is specialized to reduce the background noise caused by the whisker's own wake in the detection of the upstream target. Forces on a rigid whisker model (scale: 50x) being towed steadily down a water tank while experiencing imposed oscillations are measured. A range of frequencies and amplitudes are tested, the hydrodynamic lift coefficient in phase with velocity ($C_{L,v}$) is calculated for each, and values are combined in a contour plot. The region of positive $C_{L,v}$ peaks at an amplitude ratio of 0.1, indicating that the whisker's undulatory, asymmetric structure considerably reduces (but does not entirely suppress) regions where the structure experiences VIV in comparison with a standard cylinder, whose peak reaches an amplitude ratio of 0.8.

[1] W. Hanke, et al., "Harbor seal vibrissa morphology suppresses vortex-induced vibrations," J. Exp. Biol., vol. 213, pp. 2665-72, 2010.

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