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Seal whisker-inspired circular cylinders reduce vortex-induced vibrations HEATHER BEEM, MICHAEL TRIANTAFYLLOU, MIT — Recent work [1] shows that the undulatory, asymmetric geometry of harbor seal whiskers passively reduces vortex-induced vibration (VIV) amplitudes to less than 0.1 times the whisker diameter. This reduction holds in frontal flows, but due to the elliptical cross-section of the whisker, flows that approach from large angles of attack generate significant vibrational response. The present study investigates the possibility of extending the vibration reduction to unidirectional bodies, such that flows from all angles cause reduced VIV. A method for developing a new geometry that incorporates the "whisker" features into bodies with uniform, circular cross-section is presented. This geometry and multiple variations on it are fabricated into rigid models. Forces are measured on the models while they undergo imposed oscillations and are towed down a water tank. Contour plots of $C_{L,v}$ show peak VIV amplitudes to decrease as much as 28% from that of a standard cylinder. This result holds promise for applications where vibration reduction is desired, regardless of the angle of oncoming flow.

[1] Beem, H., et al., "Harbor Seal Vibrissa Morphology Reduces Vortex-Induced Vibrations," American Physical Society 24th Annual DFD Meeting, Nov. 2011.

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