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Hydrodynamic Disturbances Affect Self-excited Vibrations of Seal Vibrissae . CHRISTIN MURPHY, WILLIAM MARTIN, AREN HELLUM , CHARLES HENOCH, Naval Undersea Warfare Center Division Newport — Seals use their vibrissae, or whiskers, to find prey by hydrodynamic sensing and tracking. As the whiskers move through the water, self-excited vibrations are induced. We hypothesize that the features of these vibrations encode information about the disturbance source. We used laser Doppler vibrometry to study these vibrations in harbor seal whiskers exposed to water flow in a water tunnel with and without an upstream disturbance present, and at various speeds. Whiskers have an elliptical cross-sectional profile, which creates a distinct effect of angle of attack. To examine this effect, experiments were performed with the major axis of the elliptical profile parallel to the flow (0 degrees), and perpendicular to the flow (90 degrees). For the 0 case without a disturbance, the prominent vibration frequency increases as speed increases. When a disturbance is introduced, there is a clear disruption in the prominent vibration frequency. For the 90 case with no disturbance, multiple distinct vibration frequencies are excited. With increase in speed, the relative amplitudes of the excited vibrations change with respect to each other. When a disturbance is introduced, the excited vibration frequencies persist while the energy increases across the computed spectrum.

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