Whiskers as Hydrodynamic Sensors: Structures, Signals, and Sensitivity

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ABSTRACT:

Seals have the most highly specialized vibrissae (whiskers) of all mammals. They can utilize their vibrissal system to detect and track underwater hydrodynamic disturbances generated by swimming prey with fine discrimination of features such as size, shape, and movement direction. Seals' hydrodynamic detection abilities are unparalleled among animal systems and surpass that of any current sensor technology. As the vibrissae move through the water, self-excited vibrations are induced, and the features of these vibrations encode information about the disturbance source. This seminar will discuss research done to characterize the seal's vibrissal system using laser vibrometry and high-speed videography to examine the fluid interactions of the vibrissae, and CT scanning to investigate their unique morphology. These efforts aim to improve the understanding of this sophisticated biological system and advance bio-inspired sensor research.

Bio:
Dr. Christin Murphy is a research biologist at the Naval Undersea Warfare Center in Newport, RI. Her research investigates the hydrodynamic detection abilities of marine mammals. Dr. Murphy received her Ph.D. in biological oceanography from University of South Florida's College of Marine Science. She is a Fulbright scholar and a National Science Foundation Graduate Research fellow, and received the Navy's Top Scientists of the year Emergent Investigator award in 2017. Dr. Murphy applies her background in marine biology, neuroscience, and sensory biology to her work at the Navy to investigate sensory biology of marine organisms and advance bio-inspired sensor research.