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Toward Real-Time Classification of Wake Regimes from Sensor Measurements MENGYING WANG, MAZIAR S. HEMATI, Univ of Minnesota - Twin Cities — Hydrodynamic signals can transmit information that can be used by marine swimmers to detect disturbances in the local environment. Biological swimmers are able to sense and detect these signals with their hydrodynamic receptor systems. Recently, similar flow sensing systems have been developed with an aim to improve swimming efficiency in human-engineered underwater vehicles. A key part of the sensing strategy is to first classify wake structures in the external fluid, then to execute suitable control actions accordingly. In our previous work, we showed that a variety of 2S and 2P wakes can be distinguished based on time signatures of surface sensor measurements. However, we assumed access to the full dataset. In this talk, we extend our previous findings to classify wake regimes from sensor measurements in real-time, using a recursive Fast Fourier Transform algorithm. Wakes in different dynamical regimes, which may also vary in time, can be distinguished using our approach. Our results provide insights for enhancing hydrodynamic sensory capabilities in human-engineered systems.

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