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Numerical investigation of seal whiskers in distinguishing the patterns of wakes induced by moving objects with different shapes GENG LIU, QIAN XUE, XUDONG ZHENG, University of Maine — Phocid seals are able to use their whiskers (or vibrissae) to detect and track artificial and biogenic hydrodynamic trails. Well trained seals are even able to discriminate the size and shape of upstream moving objects through their wakes. The present study employs a one-way coupling model of flow-structure interaction (FSI) to investigate the hydrodynamic mechanism of the wake discrimination. The root mechanical signals of whisker arrays in the wakes induced by different moving objects are simulated and analyzed in detail. It is found that the signal patterns of whisker arrays are associated with the strength and the direction of the jets induced by the 3D vortices in the wake. The distinct signal patterns enable the seal to discriminate the shapes of upstream moving objects. In addition, a theoretical model is built to decoding the relationship between the location of the disturbance source and the sensed flow information.

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