

Abstract Submitted
for the DFD17 Meeting of
The American Physical Society

Passive object detection from pressure sensing using a 2-D viscous fluid model¹ JACK CLARK, JEONGYONG PARK, JASON DAHL, Univ of Rhode Island — Embedded pressure sensors have the ability to inform an object about the surrounding flow environment. Fish demonstrate this ability through the use of their lateral line system, which enables complex behaviors (feeding, schooling, etc.) based on measures of pressure on the surface of the body. Previous work has shown that inviscid models may be used for identifying object shapes or local flow structures based on several measurements of pressure, though these models fail to capture flow structures with large viscous effects or complex object shapes. In the present study, 2-D simulations are performed for a NACA 0012 foil passing by an object on a wall. The simulations vary object shape and size, demonstrating distinct wake behavior through pressure. A classifier is developed based on the pressure time histories in order to classify object shape and size, and demonstrated to work well using under-resolved simulated data. Experiments are also performed for a subset of object shapes and sizes. The experiments include physical sources of noise such as free surface disturbances and electrical noise to demonstrate the feasibility of this object recognition process. The classifier is tested against the physical measurements and compared with the simulated results.

¹Office of Naval Research (grant no: N00014-16-1-2968)

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Date submitted: 31 Jul 2017

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