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A Hydrodynamic Model of Lateral Line of Fish for Vortex Sensing ZHENG REN, KAMRAN MOHSENI, University of Colorado at Bolder — In this study, potential flow theory is adopted to model flow field around a fish-like body in the presence of a Karman vortex street moving along one side of the body. The external flow field is modeled in two dimensions while a fish-like body is obtained by Joukowski Transformation. Pressure distribution on the body surface is computed according to the model. The lateral line trunk canal (LLTC) of a fish is modeled as a slight tube along its body with pores uniformly distributed along the surface of the tube. With the external flow known, the flow inside LLTC driven by the pressure gradient between a pair of consecutive pores has been solved analytically. Furthermore, parametric studies are performed in order to determine the effect of various flow parameters on the pressure distribution on body surface and flow distribution inside the LLTC. The results indicate that the signature of the vortex street can be found by measuring the flow velocity distribution inside the LLTC, which serves as a possible elucidation on how a fish sense the vortex street from the flow filed inside its LLTC. Hence, it is reasonable to suggest that the LLTC of a fish is able to detect the signature of the wake vortices shed by a nearby object or fish.

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