

Abstract Submitted
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Surface signatures of momentum/zero-momentum wakes in stratified fluids¹ S.I. VOROPAYEV, H.J.S. FERNANDO, C. NATH, Arizona State University — The momentum (over- and under-thrusted) wakes of self-propelled bodies in stable density stratified fluids were studied using scaled laboratory experiments and theoretical analysis. Particle image velocimetry (PIV) and a highly sensitive cooled Infra-Red (IR) camera were used for flow diagnostics. Two problems of broad interest that have not been received adequate study were the focus of this research: (i) thermal (IR) surface signatures of wakes of submerged/surface self-propelled bodies; and (ii) thermal (IR) and hydrodynamic (PIV) surface signatures of submerged/surface turbulent jets. The measurements and modeling delineated the mechanisms of vertical turbulent transport, the types of flow structures formed at the surface and their dependence on bulk wake properties on governing parameters. The physics-based models and parameterizations so developed help extrapolate laboratory results to oceanic environments.

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H.J.S. Fernando
Arizona State University

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