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**Identifying Surface Expressions of Submerged Bottom Features Using Machine Learning** SAKSHAM GAKHAR, JEFFREY KOSEFF, NICHOLAS OUELLETTE, Stanford University — Laboratory experiments were carried out in an open-channel recirculating water flume for different bottom treatments and a variety of flow conditions. We acquired overhead images of the free surface downstream of the bottom features and used these to train convolutional neural network based classifiers. Using these classifiers, we demonstrate that information acquired at the surface alone can be used to differentiate between the physical features that lie at the bottom boundary. We show that although external physical processes such as winds can modulate the free surface, they do not necessarily eliminate the free-surface signature of the submerged bottom features. Our results provide strong motivation for future studies that probe the physical processes responsible for transporting information about the bottom of the flow to the surface.

Saksham Gakhar  
Stanford University

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