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How do fish hide in the sand: erosion by an oscillating foil ALBAN SAURET, SVI, CNRS/Saint-Gobain, CYPRIEN MORIZE, GUILLAUME QUIBEUF, PHILIPPE GONDRET, FAST Laboratory, CNRS/Paris-Sud University — In a large number of natural and technological situations, a granular bed can be resuspended by a fluid flow. In some situations, this resuspension may be to avoid, for instance when a helicopter lands in sandy environments and the generated sand cloud limits the visibility, which can lead to catastrophic events. Here, we focus on a unique situation, in which the resuspension of particles is both sought after and well controlled. Indeed, some bottom-dwelling fish, such as the flounders and stingrays, generate a flow capable of resuspending sand, to bury themselves and avoid predators. By flapping their fins with oscillating motions, they create vortices and a recirculating flow that lifts the sand particles up and deposits them on top of their backs. A simple model experiment has been developed to study this situation: a rigid or flexible foil is placed above a sand bed to mimic the fin motion. We experimentally characterized the influence of the amplitude and frequency of the motion, the distance to the granular bed and the nature of the granular material on the onset of erosion. These experimental findings are rationalized to predict the required motion to erode and resuspend the granular bed.

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