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Simulation of bio-locomotion by a momentum redistribution technique for self-propulsion OSCAR CURET, ANUP SHIRGAONKAR, NEELESH PATANKAR, MALCOLM MACIVER, Northwestern University — We have developed a general purpose computational approach for self-propulsion based on a momentum redistribution concept. In this poster, our primary goal is to show that the technique can simulate swimming of various organisms without using reduced order models for fluid dynamics. The approach fully resolves the motion of the organism and the surrounding fluid. Thus, it is an effective tool to obtain forces, flow fields, as well as the swimming velocity when the deformation kinematics of the organism are available from observational data. We will present images of computational flow fields for several examples including the aquatic locomotion of sperm, jellyfish, eel, and blackghost knifefish. These examples span a range of body configurations, swimming gaits, and Reynolds numbers in their natural environments. Peculiarities of various modes of swimming will be highlighted.

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