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Fluid Flow of Pulsing Soft Corals[1] GABRIELLE HOBSON, Scripps Institution of Oceanography, UCSD, MATEA SANTIAGO, Applied Mathematics, University of California, Merced, LAURA A. MILLER, Department of Mathematics, University of Arizona, SHILPA KHATRI, Applied Mathematics, University of California, Merced — Soft corals of the family Xeniidae significantly enhance the photosynthetic capacity of their symbiotic algae by actively pulsing to generate flow in their surrounding fluid. Fluid drawn towards the coral mixes at a sufficiently slow rate to allow for the removal of photosynthetic waste and then the fluid is transported away from the coral polyp. This active motion combined with the fact that these soft corals exist in a fluid regime where both inertial and viscous forces influence the flow makes them a unique model organism for understanding fluid mixing. The fully-coupled three-dimensional fluid-structure interaction problem of a pulsing coral and its generated flow was solved using the Immersed Boundary Finite Elements (IBFE) method, a version of the immersed boundary method which uses a finite differences method to solve the Navier-Stokes equations and a finite elements method to solve the elasticity equations. We present a study of the resulting fluid flow and mixing patterns as we vary parameters of the problem. We analyze how the characteristic vertical and horizontal velocities of the generated flow change as we vary the Reynolds number and the length of the resting time period between pulses.

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