

Abstract Submitted
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Computational Analysis of Flow Field Inside Coral Colony MD

MONIR HOSSAIN, ANNE STAPLES, Virginia Polytechnic Institute and State University — Development of the flow field inside coral colonies is a key issue for understanding coral natural uptake, photosynthesis and wave dissipation capabilities. But most of the computations and experiments conducted earlier, measured the flow outside the coral reef canopies. Experimental studies are also constrained due to the limitation of measurement techniques and limited environmental conditions. Numerical simulations can be an answer to overcome these shortcomings. In this work, a detailed, three-dimensional simulation of flow around a single coral colony was developed to examine the interaction between coral geometry and hydrodynamics. To simplify grid generation and minimize computational cost, Immersed Boundary method (IBM) was implemented. The computation of IBM involves identification of the interface between the solid body and the fluid, establishment of the grid/interface relation and identification of the forcing points on the grid and distribution of the forcing function on the corresponding points. LES was chosen as the framework to capture the turbulent flow field without requiring extensive modeling. The results presented will give insight into internal coral colony flow fields and the interaction between coral and surrounding ocean hydrodynamics.

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