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Passive vortical flows enhance mass transfer in a coral colony. MD MONIR HOSSAIN, ANNE STAPLES, Virginia Tech — Corals are sessile and rely on the surrounding ocean flow to obtain nutrients and carry out their other physiological functions. Recent studies have shown that corals in low flow conditions can stir the water column, creating vortical flows that enhance mass transfer rates by up to 400% (Shapiro et al., PNAS, 2014). Here, we perform three-dimensional immersed-boundary simulations of the flow through a single *Pocillopora meandrina* colony under high flow conditions. We demonstrate that the passive geometric features of the branching colony produce highly vortical internal flows. This enhances mass transfer at the interior of the colony and compensates almost exactly for flow speed reductions there of up to 64%, resulting in the advection time scale remaining roughly constant throughout the colony. We further compute the transport of a passive scalar from the surface of the colony under idealized sinusoidal oncoming flow conditions and find a double-peaked concentration profile in the interior of the colony.

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