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Vertical variations of coral reef drag forces SHAI ASHER, Civil and Environmental Engineering, Technion, STEPHAN NIEWERTH, KATINKA KOLL, Leichtwei-Institut fr Wasserbau, TU Braunschweig, URI SHAVIT, Civil and Environmental Engineering, Technion, LWI COLLABORATION, TECHNION COLLABORATION — Corals rely on water flow for the supply of nutrients, particles and energy. Therefore, modeling of processes that take place inside the reef, such as respiration and photosynthesis, relies on models that describe the flow and concentration fields. Due to the high spatial heterogeneity of branched coral reefs, depth average models are usually applied. Such an average approach is insufficient when the flow spatial variation inside the reef is of interest. We report on measurements of vertical variations of drag force that are needed for developing 3D flow models. Coral skeletons were densely arranged along a laboratory flume. Two corals were CT-scanned and replaced with horizontally sliced 3D printed replicates. Drag profiles were measured by connecting the slices to costume drag sensors and velocity profiles were measured using a LDV. The measured drag of whole colonies was in excellent agreement with previous studies; however, these studies never showed how drag varies inside the reef. In addition, these distributions of drag force showed an excellent agreement with momentum balance calculations. Based on the results, we propose a new drag model that includes the dispersive stresses, and consequently displays reduced vertical variations of the drag coefficient.

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