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Towards quantification of biologically generated turbulence through 3D scanning particle image velocimetry[1] MATTHEW FU, Stanford University, ISABEL HOUGHTON, The Data Institute, University of San Francisco, JOHN DABIRI, Caltech — The role of biologically generated turbulence in scalar transport and ocean mixing remains inadequately understood. Though the turbulent scales created by a single swimmer might be limited to those of the individual organism, recent work has suggested that the larger sizes associated with the aggregates of vertically migrating swimmers can introduce mixing scales relevant to the surrounding water column. Quantifying this process requires that the entire flow field and the full range of mixing scales, from the size of the aggregate to below that of the individual animal, must be resolved. While there have significant advancements in volumetric velocity measurements, the spatial resolution associated with these techniques is typically insufficient for exploring common species of vertically migrating swimmers. Here, we present a scanning particle image velocimetry apparatus for quantifying three-dimensional configurations of vertically migrating swimmers and their volumetric, three-component velocity fields and demonstrate its use on the vertical migrations of brine shrimp *Artemia salina.*

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