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Three-dimensional flow structure in a kinesin-driven active gel[1]
YI FAN, Brown University, KUN-TA WU, SETH FRADEN, ZVONIMIR DOGIC, Brandeis University, KENNETH BREUER, Brown University — An active gel of kinesin-driven microtubule bundles gives rise to a turbulent-like flow which, for a specific set of toroidal geometries, spontaneously gives rise to a coherent azimuthal flow (Wu *et al. Science* (2017)). Here we present results from a two-color velocimetry that simultaneously measures (i) the planar components of velocity of the active microtubule bundles in several $r-\theta$ planes at multiple z stacks and (ii) the three-dimensional motion of passive tracer particles throughout the entire system. This technique is used to reconstruct the structure of the active flow for both coherent and non-coherent ("turbulent") systems. We present data on the activity of the gel as a function of confinement as well as the mean velocity and fluctuating profiles for the cases in which a coherent flow develops. In addition to the azimuthal flow around the torus, we observe large-scale vortex-like secondary flow structures that form and break up in the $r-z$ plane.

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