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Collective dynamics of concentrated swimming micro-organisms[1]
JOHN O. KESSLER, Physics Dept, University of Arizona, Tucson, Az 85721, LUIS CISNEROS, Physics, Univ. of AZ, RAYMOND E. GOLDSTEIN, DAMTP, University of Cambridge, UK, CHRISTOPHER DOMBROWSKI, Physics, Univ. of AZ
— Approximately close packed populations of the cylindrical self-propelled bacteria Bacillus subtilis intermittently form domains of aligned, co-directionally swimming organisms. The velocities of these phalanxes are often "high" compared to the speed of individual swimmers. They vary with the depth of the suspension of organisms. Although the Reynolds number is <1, this collective dynamic phase, the "Zooming BioNematic" (ZBN), appears turbulent. Remarkable spatial and temporal correlations of velocity and vorticity, associated with the spontaneous appearance and decay of these surging phalanxes, were measured using appropriately modified Particle Imaging Velocimetry (PIV). These new data, together with measurements of the trajectories of individual cells, provide ingredients for a rational bio-fluid-dynamical theory of the ZBN.

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John O. Kessler
Physics, Univ. of AZ

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