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Long-range correlations in simulations of suspensions of swimming microorganisms PATRICK UNDERHILL, University of Wisconsin-Madison, JUAN HERNANDEZ-ORTIZ, Universidad Nacional de Colombia Sede Medellin, MICHAEL GRAHAM, University of Wisconsin-Madison — Simulations of large populations of hydrodynamically interacting swimming particles have been performed at low Reynolds number in periodic and confined geometries. Our simulations show that the interactions of the particles lead to long-range spatial correlations in the fluid at scales larger than the size of a single organism. These long-range correlations lead to a large enhancement in the fluid transport properties. The diffusivity of passive, non-Brownian tracer particles diverges in the periodic geometry with increasing the simulation box size. This collective motion depends on the method the organism uses for propulsion. Simple scaling arguments have also been developed that can capture much of the physics of both the swimmer and tracer motions.

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