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Long-range correlations in suspensions of swimming microorganisms PATRICK UNDERHILL, JUAN HERNANDEZ-ORTIZ, MICHAEL GRAHAM, University of Wisconsin-Madison — Recently large collections of swimming microorganisms have been observed producing collective motions on a scale much larger than the scale of a single organism. To better understand the cause of these motions, computer simulations of large populations of hydrodynamically interacting swimming particles have been performed at low Reynolds number in periodic and confined geometries. 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. However, simple scaling arguments can still capture much of the physics of both the swimmer and tracer motions.

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