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Collective dynamics of hydrodynamically interacting self-propelled particles JUAN HERNANDEZ-ORTIZ, CHRISTOPHER STOLTZ, MICHAEL GRAHAM, Department of Chemical and Biological Engineering, University of Wisconsin-Madison — Direct simulations of large populations of hydrodynamically interacting swimming particles confined between two infinite walls at low Reynolds number are performed. Hydrodynamic coupling between the swimmers leads to large-scale coherent vortex motions and regimes of anomalous diffusion that are consistent with experimental observations. According to the simulations the natural length scale for the collective dynamics of the suspension is the distance between walls. At low concentrations, swimmers propelled from behind (like spermatazoa) strongly migrate toward solid surfaces in agreement with simple theoretical considerations; at higher concentrations this localization is disrupted by the large-scale coherent motions.

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