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Hydrodynamic interactions in dilute suspensions of microswimmers JOAKIM STENHAMMAR, RUPERT NASH, DAVIDE MARENDUZZO, ALEXANDER MOROZOV, University of Edinburgh — We present a numerical method based on a Lattice-Boltzmann algorithm to simulate hydrodynamic interactions between a large number of model swimmers (order 10^5), modelled as extended force dipoles. Similar to previous studies of this problem, both experimental and theoretical, we observe that, depending on the concentration of microswimmers, there exists a transition to large-scale structures, often referred to as bacterial turbulence. We introduce a simple theory to characterize the onset of this transition and compare it to our observations. We will also present results on the influence of the large-scale structures on the enhanced diffusion of tracer particles suspended in a solution of microswimmers.

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