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Induced Diffusion of Tracers in a Bacterial Suspension: Theory and Experiments RODRIGO SOTO, Universidad de Chile, GASTON MINO, CNRS-ESPCI-Universite Paris 6 and Paris 7, JOCELYN DUNSTAN, University of Cambridge, ERIC CLEMENT, ANNIE ROUSSELET, CNRS-ESPCI-Universite Paris 6 and Paris 7 — The induced diffusion of tracers in a bacterial suspension is studied at low bacterial concentrations. Considering the swimmer-tracer hydrodynamic interactions at low-Reynolds number and using a kinetic theory approach, it is shown that the induced diffusion coefficient is proportional to the swimmer concentration, their mean velocity and a coefficient β. The coefficient scales as the tracer-swimmer cross section times the mean square displacement produced by single scatterings. Considering simple swimmer models it is shown that β increases for decreasing swimming efficiencies. Close to solid surfaces the swimming efficiency degrades and, consequently, the induced diffusion increases. Experiments on W wild-type *Escherichia coli* in a Hele-Shaw cell, under buoyant conditions, are performed to measure the induced diffusion on tracers near surfaces. The modification of the suspension pH varies the swimmers' velocity in a wide range allowing to extract the β coefficient with precision. It is found that that the solid surfaces modify the induced diffusion: decreasing the confinement height of the cell, β increases by a factor 4. The theoretical model reproduces this increase although there are quantitative differences, due to the simplified model.

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