

Abstract Submitted
for the DFD17 Meeting of
The American Physical Society

Hydrodynamic interaction between bacteria and passive sphere
BOKAI ZHANG, YANG DING, XINLIANG XU, Beijing Computational Science Research Center — Understanding hydrodynamic interaction between bacteria and passive sphere is important for identifying rheological properties of bacterial and colloidal suspension. Over the past few years, scientists mainly focused on bacterial influences on tracer particle diffusion or hydrodynamic capture of a bacteria around stationary boundary. Here, we use superposition of singularities and regularized method to study changes in bacterial swimming velocity and passive sphere diffusion, simultaneously. On this basis, we present a simple two-bead model that gives a unified interpretation of passive sphere diffusion and bacterial swimming. The model attributes both variation of passive sphere diffusion and changes of speed of bacteria to an effective mobility. Using the effective mobility of bacterial head and tail as an input function, the calculations are consistent with simulation results at a broad range of tracer diameters, incident angles and bacterial shapes.

Bokai Zhang
Beijing Computational Science Research Center

Date submitted: 31 Jul 2017

Electronic form version 1.4