Stochastic Models of Motion for Suspensions of Microorganisms

Functions of microorganisms like looking for nutrition and biological processes such as infection and reproduction are possible due to microfluidic motion. Developments over the past two decades in tracking and manipulation at the microfluidic level have made possible accurate measurements of micro-hydrodynamical flows and have provided access to a wealth of interesting biological and synthetic phenomena and a means to test the phenomena's corresponding theories. This talk focuses on these corresponding theories. Our aim is to answer questions of individual and collective mobility for a variety of protozoa and of the fluid flows they generate. We wish to give analytical expression to the individual mobility statistics, and the environmental interaction of these swimmers both with each other and with reactive profiles such as attractant chemicals. Behind this goal are ever-present systems of stochastic differential equations which we analyze using a set of asymptotic approaches.