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Concentrating Swimming Bacteria using Funnels: Connecting Simulation Results to Simple Random-Walk Models[1] YU-GUO TAO, GARY W. SLATER, University of Ottawa — Rectification of swimming bacteria has been observed when confined in a closed environment partitioned using porous walls with funnel shaped channels. Using Monte Carlo simulations that take into account the mechanical and thermodynamic properties of round-shape cells as well as the effect of noise on the run/tumble process, we show that the long-time behaviour of the system can be mapped onto a simple one-dimensional biased random-walk process. This implies that the many variables that are needed to describe the geometry of the system and the properties of the cells can be reduced to only two generalized variables plus the size of the system itself. We examine how these two variables depend on the initial variables and draw conclusions on the performance of the system when used as a tool to separate cells.

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