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Asymmetric Friction and Directed Movement of Brownian Motors OLEG ANDREEV, University of Rhode Island, VLADISLAV MARKIN, University of Texas Southwestern Medical Center, URI TEAM, UTSMC TEAM — It is assumed that a Brownian motor is a system that can rectify thermal fluctuations into directed movement. The intriguing question is how this is achieved: what is the mechanism for transferring random pulses from the environment into directed movement. A number of models have been proposed, which, in general, assume the existence of an "asymmetric flashing potential" that makes the motor's diffusion predominately in one direction. In this work, we introduce a model of Brownian motors based on asymmetric friction rather than on asymmetric flashing potential. We show that asymmetric friction can break the symmetry of a molecule's "random walk" by changing the step size depending on direction. Our model assumes the presence of a symmetrical Brownian force (Gaussian function, average force is 0), an isotropic viscous force, which is proportional to the velocity value but opposite in direction, and an asymmetric friction force, whose value depends on the direction. We present a mathematical model that explains the directed movement for several Brownian motor types.

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