

Asymmetrical Diffusion-Induced Directional Motion

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Abstract: Competition between anomalous diffusion and normal diffusion along two different directions of the track for a Brownian motor, combined with a periodic potential flashing, can lead to a macroscopic motion. The current is calculated analytically by using the Astumian-Bier's approach of the step number per cycle. It is shown that the direction of current occurs reversal for different waiting times of the potential off and the magnitude of current is prominently enhanced. Moreover, a thermal "green" noise is proposed to produce the ballistic diffusion, numerical simulations for the average velocity of the particle in the presence of ballistic and normal diffusions support the present theoretical findings.

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Key words: current, ratchet potential, Levy flights, ballistic diffusion

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