Effective Potential of a Two-State Model for Molecular Motor

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Abstract: We study force generation and motion of molecular motors using a simple two-state model in the paper. Asymmetric and periodic potential is adopted to describe the interaction between motor proteins and filaments that are periodic and polar. The current and the slope of the effective potential as functions of the temperature and transition rates are calculated in the two-state model. The ratio of the slope of the effective potential to the current is also calculated. It is shown that the directed motion of motor proteins is relevant to the effective potential. The slope of the effective potential corresponds to an average force. The non-vanishing force therefore implies that detailed balance is broken in the process of transition between different states.

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