

Application of the Transition Probability Matrix to Colloidal Diffusion in a Periodic Energy Landscape

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The transition probability matrix (TPM) is generally applied to the study of molecular conformational transition. Our group have shown the applicability of TPM to colloidal diffusion systems, in which particles diffused in a two-dimensional hexagonal periodic energy landscape whose barrier height varied from 1.5 kBT to 4.8 kBT. When the lag time was greater than a threshold value, the system appeared Markovian, and a 2×2 TPM was built. Quantitative relation between the implied timescale and mean first-passage time (MPFT) in our system was deduced. The MPFT and the inter-state energy barrier height were calculated from the TPM and compared to those obtained with other methods. Several other general properties of the TPM were also tested.