



سمینار هفتگی گروه ماده چگال نرم

Asymmetric Simple Exclusion Process (ASEP) and Diffusion Coefficient

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Particle transport across membranes is a crucial intermediate step in almost all biological and chemical engineering processes. Separation, catalysis, and drug release all rely on controlled transport through microscopic channels. Biological examples include integral membrane proteins which traverse hydrophobic, highly impermeable lipid membranes and participate in small molecule transport. This transport could be expressed accordingly with asymmetric simple exclusion process (ASEP). In general, The asymmetric exclusion processes is a Markov process on $\{0, 1\}^{\mathbb{Z}^d}$ consisting of interacting continuous time random walks with asymmetric jump rates. There is at most one particle allowed per site. A particle at a site x waits for an exponential time and then jumps to y provided the site is not occupied.

The application of the ASEP model to describe the molecular transport through the nanopores and its relations with diffusion coefficient will be discussed. The probable phase transitions based on the hopping rates and their phases will be discussed too.

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