

Abstract Submitted
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Two-Component Diffusion¹ ANNA STEPHENSON, JAYANTA RUDRA, Oklahoma School of Science and Mathematics — When two diffusing components propagate through the same material, the space that is occupied by one component may not be occupied by the other. This interaction, which is purely geometrical and non-chemical in nature, plays an important role in the dynamics of two-component flow. It redefines the diffusing space for each of them and each component sees its surrounding space being constrained by the other. We use a novel approach to describe the diffusion of two components through a discrete lattice of a narrow channel. Specially, we look at the influence of a fast component on a slow one and vice versa. We express the time evolution of the joint probability distribution of two diffusing components in terms of a modified Master equation such that both of these may not occupy the same lattice site at the same time. From this restricted time evolution of the joint probability distribution we then calculate relative flow rate of the component and infer whether such a channel could be used as a molecular sieve to separate a slow component from a fast one.

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