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**Asymmetric exclusion process models for translation and biological transport**

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In the totally asymmetric simple exclusion process (TASEP), particles travel unidirectionally along a one-dimensional lattice and interact with each other by hard-core exclusion. Variants of the TASEP have been used to model the movement of molecular motors along biopolymers, including ribosomes on mRNA and various motors on cytoskeletal filaments. Ribosomes synthesize proteins as they traverse an mRNA molecule, so their motion is important in understanding the kinetics of protein production. We model protein synthesis as a TASEP with quenched disorder in the particle hopping rates. The hopping rates are determined by gene sequences and the availability of biomolecules. We use a statistical ensemble method in fitting the model to experimental data. The model is able to explain much of the nonlinear relationship between mRNA and protein levels.