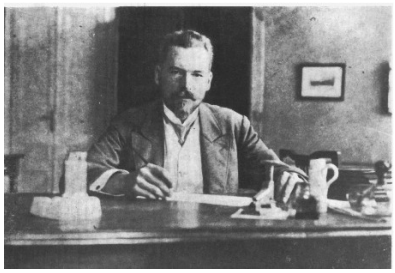

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# Non-equilibrium Steady States of the Brownian Asymmetric Simple Exclusion Process

*Monday, 3 September 2018 11:45 (20 minutes)*

We discuss non-equilibrium steady states of a system of Brownian hard spheres diffusing in a one-dimensional cosine potential, where a small static bias is driving the particles in one direction. The amplitude of the cosine potential in this Brownian asymmetric simple exclusion process (BASEP) is assumed to be large compared to the thermal energy, leading to a hopping motion of the particles between potential wells. Thus, one may expect that the non-equilibrium steady states of the BASEP are similar to those of its lattice counterpart, the asymmetric simple exclusion process (ASEP). Contrary to this expectation, the BASEP exhibits a much richer behavior due to the additional length scale in the problem brought by the particle diameter. Compared to the case of non-interacting particles, we find both current enhancement caused by multi-occupation of potential wells for small particle diameters and current suppression caused by a blocking effect for large diameters. The phase diagram of the BASEP with open boundaries depends on the particle diameter and can contain five phases. The ASEP-like behavior is observed only in a limited range of parameters. We furthermore discuss transition times and splitting probabilities for a tagged particle in the BASEP. These quantities exhibit a remarkable asymmetry, which we relate to the collective particle motion.

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