

## Abstract

The ratchet effect in the colloidal suspension moving in a narrow channel of a periodically varying diameter can be used for particle separation by sizes. We study this phenomenon by mapping the colloid in the channel onto one-dimensional lattice models in which particles stochastically jump between sites with exclusion interaction.

Besides allowing multiple occupancy of sites, we consider a mixture of small and big particles as well as complex geometry of the one-dimensional lattice when each site is joined to a lateral pocket.

Currents of particles calculated within the mean-field approximation of the master equation approach are compared to Monte Carlo simulations.

Phase diagram contains the density domain where the ratchet currents of small and big particles are of opposite directions, thus enabling full size separation.

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