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Lattice many-body systems with a flow

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Abstract

The matrix product state approach to interacting many-body systems was inspired by the inverse scattering method and developed to describe the stationary behaviour. Driven diffusive system have the intriguing feature that the properties of the steady state strongly depend on the boundary rates. Led by the importance of the boundary conditions for nonequilibrium states we show that the boundary conditions of the simple exclusion process on a lattice define the boundary symmetry as the tridiagonal Askey–Wilson algebra. It has the property of a coideal subalgebra of the quantum affine $\mathrm{U}_q\big(\widehat{(\mathrm{su}(2)}\big)$. This is consistent with the equivalence of the process to the integrable XXZ spin chain, whose bulk invariance (infinite chain) is the affine $\mathrm{U}_q\big(\widehat{(\mathrm{su}(2)}\big)$. We argue that the boundary Askey–Wilson symmetry is the deep algebraic property of the process allowing to extend the exact solvability beyond the stationary state.