Hydrodynamic behavior of long-range symmetric exclusion with a slow barrier: superdiffusive regime

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Abstract. We analyse the hydrodynamical behavior of the long-jumps symmetric exclusion process in the presence of a slow barrier. The jump rates are given by a symmetric transition probability $p(\cdot)$ with infinite variance. When jumps occur from $\mathbb{Z}_-^*$ to $\mathbb{N}$, the rates are slowed down by a factor $\alpha n^{-\beta}$ (with $\alpha > 0$ and $\beta \geq 0$). We obtain several partial differential equations given in terms of the regional fractional Laplacian on $\mathbb{R}^*$ and with different boundary conditions. Surprisingly, in opposition to the diffusive regime, we get different regimes depending on whether $\alpha = 1$ (all bonds with the same rate) or $\alpha \neq 1$.

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