Liggett, Thomas M.

Finite nearest particle systems. (English) Zbl 0557.60087

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The model considered here generalizes the Harris contact process (state space: the finite subsets of Z) in the following way: the death rate of any particle is again identically one, the birth rate at a site is a symmetric function β (l,r) of its distance to the nearest occupied site to the left and right of it, which satisfies an irreducibility and non-explosion condition. The problem is to find criteria for extinction (which means extinction a.s.) and survival (which means survival with positive probability) in terms of $b_n := \sum_{l+r=n} \beta(l,r)$, $n \geq 2$. The result is contained in

Theorem 1.7. (1) If $b_n \leq 1$ for all n, the process dies out.

(2) To each $b > 2$ there is a nearest particle process with $b_n = b$ for all n, which survives.

(3) If $b_n \geq 4$ for all n, the process survives.

The most interesting part is (3), for the proof of which a particular comparison between the given process and a contact process has to be constructed.

Reviewer: H.Rost

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60K35 Interacting random processes; statistical mechanics type models; percolation theory

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