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Branching random walks and contact processes on homogeneous trees. (English)

Zbl 0867.60092

Probab. Theory Relat. Fields 106, No. 4, 495-519 (1996).

Summary: Branching random walks and contact processes on the homogeneous tree in which each site has $d + 1$ neighbors have three possible types of behavior (for $d \geq 2$): local survival, local extinction with global survival, and global extinction. For branching random walks, we show that if there is local extinction, then the probability that an individual ever has a descendent at a site n units away from that individual's location is at most $d^{-n/2}$, while if there is global extinction, this probability is at most d^{-n} . Next, we consider the structure of the set of invariant measures with finite intensity for the system, and see how this structure depends on whether or not there is local and/or global survival. These results suggest some problems and conjectures for contact processes on trees. We prove some and leave others open. In particular, we prove that for some values of the infection parameter λ , there are nontrivial invariant measures which have a density tending to zero in all directions, and hence are different from those constructed by *R. Durrett* and *R. Schinazi* [Ann. Probab. 23, No. 2, 668-673 (1995; Zbl 0830.60093)].

MSC:

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

Cited in 14 Documents

Keywords:

branching random walks; local extinction; global extinction; contact processes on trees

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