

## Durrett, Rick

**Ten lectures on particle systems.** (English) [Zbl 0840.60088](#)

Biane, Philippe (ed.) et al., Lectures on probability theory. Ecole d'été de probabilités de Saint-Flour XXIII - 1993. Lectures given at the summer school in Saint-Flour, France, August 18-September 4, 1993. Berlin: Springer-Verlag. Lect. Notes Math. 1608, 97-201 (1995).

The lectures represent the introduction to mathematical techniques used in the interacting particle systems theory. The lectures material is concentrated on the problem of proving the existence of nontrivial stationary distributions for such systems and is divided into nine sections.

1. Overview: It is given the overview of the models, that the theory concerns, and also of the main statements, that are proved in the following lectures. 2. Construction. Basic properties: The existence theorem for particle systems with translation invariant finite range interactions and also some basic properties of the used random processes are proved. 3. Percolation substructures. Duality: It is devoted to the duality property and to connections of processes under consideration with percolation processes. 4. A comparison theorem: Here the solving method of the existence stationary distribution problem is described. This method was proposed earlier in the work of R. Durrett and M. Bramson. It allows to prove the existence of stationary distributions for attractive systems with state space  $\{0, 1\}^{\mathbb{Z}^d}$ . 5. Threshold models: The comparison theorems are introduced. These theorems manifest the connection between the processes of interest with oriented percolation. The author applies the comparison theorems to special cases: the threshold (voter and contact) models. 6. Cyclic models: The comparison theorems are applied to the cyclic model systems (color model and Greenberg Hastings one). 7. Long range limits: The long range limit of contact process is studied. 8. Rapid stirring limits: The convergence of particle systems to the solution of a reaction diffusion equation is investigated. It does for the process with translation invariant finite range flip rates and for the process of rapid stirring. 9. Predator prey systems: The existence of stationary distributions for systems with fast stirring and, as a consequence, the phase transition existence for predator prey systems are proved.

For the entire collection see [[Zbl 0822.00009](#)].

Reviewer: [Yu.P.Virchenko \(Khar'kov\)](#)

### MSC:

[60K35](#) Interacting random processes; statistical mechanics type models; percolation theory

[81S25](#) Quantum stochastic calculus

Cited in **69** Documents

### Keywords:

[particle system](#); [Markov process](#); [finite range interaction](#); [flip rates](#); [voter model](#); [percolation](#); [duality](#)