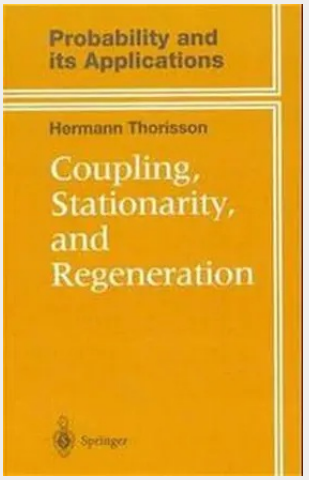
Thorisson

Coupling, Stationarity, and Regeneration



Coupling is a general method of establishing properties of random variables and processes through a joint construction on a common probability space. This method has relevance to all areas of probabilistic inquiry including quantum physics, self-similarity, relativity, and queueing theory. In addition to providing new developments in coupling, this book also includes self-contained treatments of Markov chains, stationarity, regeneration, perfect simulation, and quasi-stationarity.

This is a book on coupling, including self-contained treatments of station arity and regeneration. Coupling is the central topic in the first half of the book, and then enters as a tool in the latter half. The ten chapters are grouped into four parts as follows: Chapters 1-2 form an introductory part presenting basic elemen tary couplings (Chapter 1 on random variables) and the classical tri umphs of the coupling method (Chapter 2 on Markov chains, random walks, and renewal theory). Chapters 3-7 present a general coupling theory highlighting max imal couplings and convergence characterizations for random ele ments, stochastic processes, random fields, and random elements un der the action of a transformation semigroup. Chapters 8-9 present Palm theory of stationary stochastic processes associated with a simple point process. Chapter 8 treats the one dimensional case and Chapter 9 the higher-dimensional case. Chapter 10 deals with regeneration, both classical regenerative pro cesses and three generalizations: wide-sense regeneration (as in Harris chains); time-inhomogeneous regeneration (as in time-inhomogeneous recurrent Markov chains); and taboo regeneration (as in transient Markov chains). It ends with a section on perfect simulation (cou pling from-the-past). This enormous chapter is thrice the size of a normal chapter, and is really a book within the book.

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