

**Anderson, William J.**

**Continuous-time Markov chains. An applications-oriented approach.** (English)

Zbl 0731.60067

Applied Probability, 7; Springer Series in Statistics, Probability and its Applications. New York etc.: Springer-Verlag. xii, 355 p. DM 128.00 (1991).

The time-continuous Markov chains consist of one of the main branches of the stochastic processes. It has played a critical role in the development of probability theory and has various applications in various fields. Even though in the last fifty years, the subject is well-developed and several systematic books appeared almost thirty years ago, the reader may find that the Anderson's book with familiar title is quite different from the existing ones. In the past 20-30 years, the progress on the subject is remarkable. Some important open problems were solved and some new topics have been added. An essential part of the progress is carefully collected in the book. Thus, as mentioned by the author, "this book is intended to complement and not replace, the sample path oriented books by *K.-L. Chung* [Markov chains with stationary transition probabilities (1967; Zbl 0146.384)], *D. Freedman* [Brownian motion and diffusion (1971; Zbl 0231.60072)] and *D. Williams* [Diffusion, Markov processes and martingales. Vol. 1: Foundations (1979; Zbl 0402.60003)]".

Roughly speaking, the book deals with four aspects of the theory of Markov chains. a) The existence and uniqueness criteria for the processes for which the main progress was made in 1970's (Chapters 2 and 4). b) Invariant measures and several types of ergodicity for the processes (Chapters 5 and 6). These topics were studied by many authors and "completed" around 1980. c) Reversibility, monotonicity and other properties of the processes (Chapter 7). d) Finally, as some applications of the results discussed in the previous chapters, the author deals with the birth-death processes and multidimensional population processes (Chapters 8 and 9). Of course, these two special processes are most common met in practice. As I know, most of the materials appeared in the book form at the first time.

The book is well-organized. The reviewer appreciates the details which should be very much helpful for the reader. It is no doubt that this book will become an excellent reference for both researchers and for works in various applied area.

Let me point out that the subject is also well-developed in China, some of the papers are included in Anderson's book. In the past 13 years, about 7 related books have been published in China, some of them have been already translated into English. Refer to the reviewer's book "From Markov chains to non-equilibrium particle systems" (World Scientific Publishing, 1991) for more references and additional materials.

Reviewer: [Chen Mu-fa \(Beijing\)](#)

**MSC:**

[60J27](#) Continuous-time Markov processes on discrete state spaces

[60-02](#) Research exposition (monographs, survey articles) pertaining to probability theory

Cited in **1** Review  
Cited in **245** Documents

**Keywords:**

existence and uniqueness criteria; Invariant measures; Reversibility; monotonicity; multidimensional population processes