Limnios, N.; **Oprişan, G.**
Semi-Markov processes and reliability. (English) Zbl 0990.60004
Statistics for Industry and Technology. Basel: Birkhäuser. xii, 222 p. (2001).

This book is in two parts: the first presents semi-Markov process theory from scratch; the second discusses applications of these processes to problems in reliability. The authors claim that the text is "within reach of those who have a first course in probability theory", but it assumes rather more than this: it is really a handbook for researchers.

In the first part, after a brief roll call of stochastic processes, emphasizing renewal theory, the formal machinery of general state-space Markov renewal processes is set up. There is no motivation at this stage. In a similar vein, semi-Markov processes are then developed, and there is a discussion of the Markov renewal equation, process functionals and jump time asymptotics. For the countable state-space case some more specialized topics are covered, such as limit theorems for recurrence time processes, statistical estimation of semi-Markov kernels and renewal functions, and phase-type kernels.

The second part, which refers to the first rather sparingly, explains how semi-Markov processes can be applied in studying various aspects of the dependability of systems: reliability, availability, maintainability, performability, etc. The emphasis is on finite state-space models; in particular, six methods are outlined for calculating system transition probabilities. The generalities are illustrated by a selection from the literature of specific system models. The book closes with a brief account of Monte Carlo methodology.

There are numerous minor inconsistencies and slips, by far the most amusing of which is the phrase "finitely maNew York states' that appears in the bibliography.

Reviewer: J.Preater (Keele)

MSC:

60-02	Research exposition (monographs, survey articles) pertaining to probability theory
60K15	Markov renewal processes, semi-Markov processes
60K20	Applications of Markov renewal processes (reliability, queueing networks, etc.)

Cited in **1** Review
Cited in **69** Documents

Keywords:

Markov renewal process; semi-Markov process; functionals; limit theorems; reliability; availability; maintainability; performability