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Monte Carlo simulation, thanks to the great development of computer power, has become the most effective tool for performing realistic reliability and availability analysis. The inherent flexibility of Monte Carlo simulation allows accounting for realistic operating aspects such as, for example, load-sharing and stand-by, ageing processes and maintenance policies, multi-states and performance levels. This is of fundamental importance for systems and plants, such as, for example, those employed in the nuclear, aerospace and chemical industry, which are safety-critical and must be designed and operated within a risk-informed approach.

For its properties, Monte Carlo simulation is the prominent method for the solution of dynamic reliability problems and for the numerical evaluation of stochastic Petri Nets (see the LiLoLe book "Petri Nets for Reliability Modeling").

This book introduces the principles underlying the Monte Carlo simulation method and its application to reliability and availability problems within the framework of the probabilistic risk assessment of complex systems. Potential readers are all types of engineers, operations researchers as well as teachers and students of universities.

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