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# Survey of reliability and availability evaluation of complex networks using Monte Carlo techniques

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## Abstract

Generally there are four main difficulties in evaluating complex large-scale system reliability, availability and MTBF: the system structure may be very complex; subsystems may follow various failure distributions; subsystems may conform to arbitrary failure and repair distributions for maintained systems; the failure data of subsystems are sometimes not sufficient, reliability test sample sizes tend to be small. It is difficult and often impossible to obtain s-confidence limits of them by classical statistics. Monte Carlo technique combined with Bayes method is a powerful tool to solve this kind of problems. In this survey, the typical existing Monte Carlo reliability, availability and MTBF simulation procedures, variance reduction methods, and random variate generation algorithms are analyzed and summarized. The advantages, drawbacks, accuracy and computer time of Monte Carlo simulation in evaluating reliability, availability and MTBF

of a complex network are discussed. Finally, some conclusions are drawn and a general Monte Carlo reliability and MTTF assessment procedure is recommended.



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