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Signatures of indirect majority systems. (English) Zbl 1042.62090
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Summary: If τ is the lifetime of a coherent system, then the signature of the system is the vector of probabilities that the lifetime coincides with the i th-order statistic of the component lifetimes. The signature can be useful in comparing different systems. In this treatment we give a characterization of the signature of a system with independent, identically distributed components in terms of the number of path sets in the system as well as in terms of the number of what we call ordered cut sets.

We consider, in particular, the signatures of indirect majority systems and compare them with the signatures of simple majority systems of the same size. We note that the signature of an indirect majority system of size $r \times s = n$ is symmetric around $2^{-1}(n + 1)$, and use this to show that the expected lifetime of an $r \times s = n$ indirect majority system exceeds that of a simple (direct) majority system of size n when the components are exponentially distributed with the same parameter.

MSC:

62N05 Reliability and life testing
60K10 Applications of renewal theory (reliability, demand theory, etc.)
62C05 General considerations in statistical decision theory

Cited in **58** Documents

Keywords:

system reliability; signature of coherent systems; order statistics; simple and indirect majority systems

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