

Modelling failure risks in load sharing systems with heterogeneous components

Journal Article

[Tim Pesch](#)

Authors: Tim Pesch, Erhard Cramer, Edward Cripps, Adriano Polpo

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A load sharing system has several components and the failure of one component can affect the lifetime of the surviving components. Since component failure does not equate to system failure for different system designs, the analysis of the dependency structure between components becomes a meaningful exercise. The Extended Sequential Order Statistics model allows us to model a dependence structure between heterogeneous components in load sharing systems. However, the results may suggest that the risk of failure decreases as components fail sequentially, which can be counterintuitive, especially when data is scarce. We propose to address this issue by imposing an order restriction on the model parameters that represent increasing failure risks. This assumption corresponds more realistically to the physical properties of the system in many applications. We discuss the advantages of the newly proposed estimates and describe situations where they should be used with caution.

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