

Shakedown Safety Criterion in Reliability Analysis

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This paper discusses the problems of integration of the shakedown analysis with the reliability analysis. Failure functions with respect to inadaptation (non-shakedown) and limit state are defined in the space of random material/geometrical parameters, load multipliers, and directional cosines. Then, a general problem of time-invariant shakedown reliability analysis is formulated. For special cases with low variance of stochastic parameters, simplified formulations are derived and discussed. Separation of load and resistance terms in the failure functions is suggested. The computation can be further simplified since the shakedown response surface may be computed in advance. The problems may be efficiently solved by reliability simulation methods or FORM/SORM combined with a general shakedown analysis algorithm integrated with the Response Surface Method. A practical industrial example of shakedown reliability evaluations is presented.

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