

Reliability Analysis of Structures with Interval Uncertainties under Stochastic Excitations

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Abstract

Reliability analysis of randomly excited linear structures with uncertain parameters is addressed. The excitation is modeled as a stationary Gaussian random process.

Uncertainty in structural parameters is handled within a non-probabilistic framework by applying the interval model (see Elishakoff and Ohsaki, 2010).

Under the assumption of independent up-crossings of a specified threshold, a procedure for the analytical derivation of interval reliability is presented.

The key idea is to perform stochastic analysis in the frequency domain by applying the *improved interval analysis* (see Muscolino and Sofi, 2012; Muscolino and Sofi, 2013) in conjunction with the so-called *Interval Rational Series Expansion* (see Muscolino and Sofi, 2013).

This approach yields approximate explicit expressions of interval response statistics and structural reliability along with their sensitivities (see Muscolino et al., 2013) with respect to the uncertain parameters, providing useful information to increase the safety level.

References

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