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Extreme Value Distribution and Dynamic Reliability of Stochastic Structures

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A probability density evolution method to compute the extreme value distribution and dynamic reliability of stochastic structures is presented. In the past few years, an original method, by which the instantaneous probability density function (PDF) of the dynamic responses of stochastic structures can be computed, has been developed. In the method, if the PDF of any response quantity is needed, a related joint probability density evolution equation is deduced and numerically solved to give the instantaneous PDF. In the present paper, a virtual stochastic process, related to the extreme value of the considered response, is firstly constructed and then a probability density evolution equation can be deduced and numerically solved in an analogous way. The dynamic reliability of the stochastic structural system is then assessed by a simple integration. The comparison with the Monte Carlo simulation shows that the proposed method is of accuracy and efficiency.

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