DYNAMIC ANALYSIS OF UNCERTAIN STRUCTURES USING IMPRECISE PROBABILITY

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Abstract: A new method for dynamic response spectrum analysis of structures with uncertainty in their mechanical properties utilizing the notion of imprecise probability is developed. This finite-element-based method is capable of obtaining probabilistic bounds of the dynamic response of the structure with uncertainty defined by enveloping p-boxes. The developed method obtains probabilistic bounds on 1) the mode shapes, 2) modal coordinates, and 3) modal participation factor, leading to the p-boxes of modal responses. Finally maximum modal responses are combined to obtain the structure's maximum total response with consideration of uncertainty. Numerical examples demonstrating the developed method are included.

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