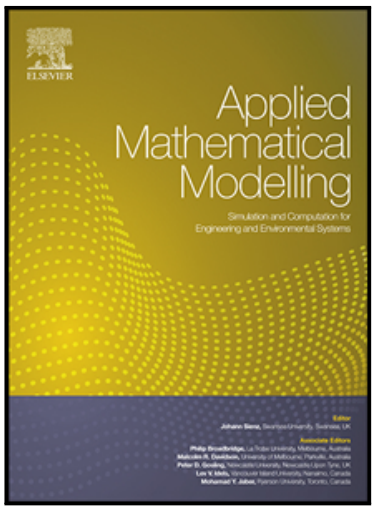

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Time Response of Structure with Interval and Random Parameters Using a New Hybrid Uncertain Analysis Method

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1. Time responses of engineering structures with interval and/or random parameters are investigated systematically.
2. Polynomial-chaos-Legendre-metamodel method is presented for structure with hybrid interval and random parameters.
3. Legendre metamodel method is presented for structure with interval parameters.
4. Polynomial chaos theory is applied for structure with random parameters.

Abstract

Practical structures often operate with some degree of uncertainties, and the uncertainties are often modelled as random parameters or interval parameters. For realistic predictions of the structures behaviour and performance, structure models should account for these uncertainties. This paper deals with time responses of engineering structures in the presence of random and/or interval uncertainties. Three uncertain structure models are introduced. The first one is random uncertain structure model with only random variables. The generalized polynomial chaos (PC) theory is applied to solve the random uncertain structure model. The second one is interval uncertain structure model with only interval variables. The Legendre metamodel (LM) method is presented to solve the interval uncertain structure model. The LM is based on Legendre polynomial expansion. The third one is hybrid uncertain structure model with both random and interval variables. The polynomial-chaos-Legendre-metamodel