Finite Element Reliability of Two Dimensional Continua with Geometrical Nonlinearity

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Abstract:
First and second-order reliability methods and the finite-element method are combined into a general methodology for reliability analysis of complex structures with uncertain characteristics and subjected to random loads. Application of the methodology to geometrically nonlinear, elastic 2D continua with random field properties and static loads is presented. The formulation employs newly derived analytical expressions for the response gradient of geometrically nonlinear continua. Example results for a plate with random field properties and geometry are presented, which illustrate the influence of correlation lengths on the plate reliability, and the sensitivities of the reliability with respect to various parameters.

Subject Headings: Finite element method | Geometrics | Sensitivity analysis | Plates | Two-dimensional analysis | Structural reliability | Structural members | Nonlinear analysis

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