Код: 10928

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A Bayesian Approach for Identification of Structural Crack Using Strain Measurements

Дрезден, Германия, 2012 год

8 стр; формат: 23,5 x 16 см; библиографический список: 12 единиц

This paper proposes a statistical approach for identifying crack in structure using strain measurements and Bayesian inference, in which uncertainties from modeling error and measurement noise are explicitly included. The Bayesian approach is a model-based method, the crack is first represented by a set of parameters, i.e., coordinates of the two endpoints of the crack. An array of strain sensors is mounted on the structure to gather strain measurements under a known static loading. A forward model based on extended finite element method (XFEM) characterizing the strain responses of the structure with crack is incorporated in the identification procedure. By combining the measurement data and the prior information, Bayes' Theorem is used to update the probability distributions of the parameters of crack. A Markov chain Monte Carlo (MCMC) algorithm is employed for sampling the parameters' posterior distributions. Numerical study is conducted to demonstrate the effectiveness of the proposed method.

Доклад. 6-я Европейская конференция по мониторингу технического состояния сооружений, 2012. Редакция Кристиана Боллера.

Ключевые слова:

Содержание