Код: 10793

T.-Y. Hsu, W.-Y. Liao

Numerical Studies of a Damage Detection Method for Beam Structures Based on Local Flexibility and Modal Macro-Strain

Дрезден, Германия, 2012 год

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

The vibration-based global damage detection methods try to extract modal parameters from vibration signals as the main structural features and then apply these features to perform damage diagnosis. For a beam structure, the vibration signals are usually lateral acceleration, velocity or displacement. As a result, the extracted mode shapes are "lateral displacement" mode shapes. In this study, the "rotatory displacement" mode shapes were extracted from the macro-strain vibration signals. These rotatory displacement mode shapes were employed to detect damage of a beam structure utilizing the local flexibility method. The proposed method was verified by numerical studies of a simply supported beam. The finite element model was constructed using the ANSYS software with solid elements. The exact mode shapes and natural frequencies of the intact and damaged cases were obtained from modal analysis of the finite element model. The effects of the number of modes, damage locations and noise in the modal parameters on damage detection results were discussed in the numerical studies. The results illustrate potential feasibility of the proposed idea and the potential advantage of utilizing macro-strain mode shapes over the lateral displacement mode shapes in noisy conditions. However, further experimental research is necessary to verify the applicability of the proposed approach to real structures.

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

Ключевые слова:

Содержание