Structural Damage Identification by Means of Neural Network (Evaluation of Identification Capability)

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Abstract

Damage identification of structural system can be dealt with by means of an inverse problem approach; that is, the location as well as the magnitude of damage is determined by inversely solving the relationship between the damage and the corresponding change in structural characteristics. In this study, we adopt a definite number of natural frequencies as such structural characteristics. A multi-layered neural network approach based on an alternative error back-propagation with fixed connection weights is used to solve the inverse problem. The damage identification based on change in natural frequencies inherently has ill-posed nature. We carry out a comprehensive simulation study and discuss the capability of the proposed damage identification approach.

Keywords: structural health monitoring; inverse problem; neural network; natural frequencies; truss.