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Multi-Source Acoustic Emission Signals Analysis Based on Blind Source Separation Using Macro Fiber Composite

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In case of multiple damage sources, i.e. acoustic emission sources, signals from different damage sources are overlap each other during propagation as elastic stress wave. This article proposes a methodology to identify and separate multi-source acoustic emission signals using both Blind Source Separation (BSS) technique and Macro Fiber Composites (MFC) sensors. This methodology will be applied on plate structure, in which the acoustic emission signal propagates as Lamb wave. The strain responses under arbitrary excitations are simulated numerically. Voltage response of piezoelectric sensors is calculated analytically for the different angles of incidence of signal. Considering the simplified case, i.e. a couple of sensors and acoustic sources, the transform matrix for BSS from acoustic emission source to response of sensors is obtained with respect to different angles of incidence of signal. For identifiability of multi-source acoustic emission signals based BSS analysis, full rank of transform matrix is essential, while the transform matrix is not reversible for only few special cases. Numerical simulation for separation of multi-source acoustic emission signals is presented in this article.

Ключевые слова:

Содержание.

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