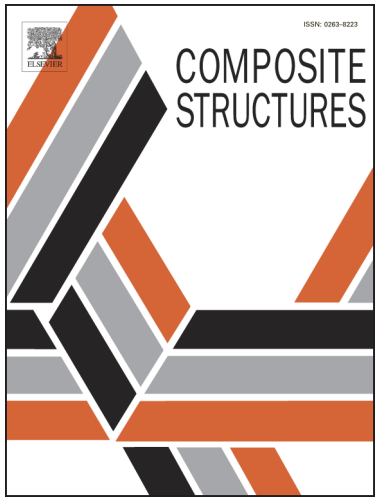

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Damage Detection in Beam-like Composite Structures via Chebyshev Pseudo Spectral Modal Curvature

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Abstract

This paper presents the Chebyshev pseudo spectral modal curvature formulation for damage detection in beam-like composite structures. The proposed method is the extension of authors' former work which is based on the Fourier spectral method. The Chebyshev pseudo spectral modal curvature overcomes the severe shortcomings of Fourier transform based spectral formulation which has serious problems associated with the wrap-around effect while analyzing the finite length signal. Moreover, the proposed method inherits the spatial filtering capability and spectral accuracy of the Fourier spectrum-based modal curvature, which ensures the robustness of the modal curvature calculation in noisy conditions. The validations of the presented method and comparisons with the Fourier spectrum based method are numerically and experimentally demonstrated for composite structures.

Keywords: Chebyshev pseudo spectrum, modal curvature, damage detection, composite beam, wavenumber domain filtering