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Damage Identification of Bridge Under Vehicle Induced Vibration Using Empirical Mode Decomposition

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Abstract

It has become essential to create a mechanism for accurate and trustworthy structure health monitoring. An effective tool for identifying global damage is provided by time-frequency algorithms. This paper proposes an instantaneous phase angle based damage indicator. The empirical mode decomposition (EMD) has been exploited for determining the instantaneous parameters. Using EMD, the signal is decomposed into its mono components. The damage index has been derived from the correlation of the extracted Intrinsic Mode Functions (IMFs) of healthy and damaged structures. To show that the suggested approach is effective, a numerical case study employing the bridge's Finite Element Model under vehicle-induced vibration has been considered. The result shows that the proposed method effectively detects and locates the damage under vehicle-induced vibration loads.

Keywords: Time frequency methods, Empirical mode decomposition, Damage identification