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A New Damage Detection Method for Bridge Condition Assessment in Structural Health Monitoring

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This paper introduces a newly proposed “State Representation Methodology (SRM)” and its application to bridge condition assessment based on the bridge monitoring data. The SRM is a novel tool that can provide some ideas and algorithms for data mining in the bridge monitoring system. The state of a system such as bridge structure can be obtained by a state variable that calculate from a State Representation Equation (SRE). A Kernel function method which plays an important

role in the Support Vector Machines (SVM) is applied to get solutions of the SRE. In the computation of the SRE, it needs to be changed into a Large-Scale Linear Constraint Problem (LSLCP). A new compatible algorithm is therefore proposed for solving technique of the LSLCP. Before using the SRM, it is necessary that the system features need to extract from the complex responses observed data in the system. Consequently, a new time-frequency analysis tool, called Frequency Slice Wavelet Transform (FSWT), will be able to powerfully reveal a change of the

characteristics in vibration signal. The FSWT produces five new properties in contrast with the traditional wavelet transform. Therefore, the paper will show the new method that can be used widely in signal processing. In this paper, it will also be introduced a general theory for the non-parametric description of the infrastructure system’s state and will demonstrate how to apply the SRM to practical problems.

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Ключевые слова:

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