TRAIN-INDUCED VIBRATION PREDICTION IN MULTI-STORY BUILDINGS USING SUPPORT VECTOR MACHINE

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Abstract: Train-induced vibration prediction in multi-story buildings can effectively provide the effect of vibrations on buildings. With the results of prediction, the corresponding measures can be used to reduce the influence of the vibrations. To accurately predict the vibrations induced by train in multi-story buildings, support vector machine (SVM) is used in this paper. Since the parameters in SVM are very vital for the prediction accuracy, shuffled frog-leaping algorithm (SFLA) is used to optimize the parameters for SVM. The proposed model is evaluated with the data from field experiments. The results show SFLA can effectively provide better parameter values for SVM and the SVM models outperform a better performance than artificial neural network (ANN) for train-induced vibration prediction.

Key words: *Vibration, railway, train, building, support vector machine, shuffled frog-leaping algorithm*

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1. Introduction

With the emergence of railways in urban areas, there have been complaints of vibrations caused by the passage of trains. In particular, with the rapid development of high-speed railway and urban rail transit system, the environmental vibration induced by running trains has attracted more attentions. As one kind of vibration caused by train, building vibration from train has attracted the interests of researches due to the requirements of high-quality living conditions. Therefore, it is necessary to predict the vibration in multi-story buildings caused by train for building new railway or making corresponding control measures to the established rail.

Due to the complexity of civil structures, limitations of data acquisition systems, the inadequacy of modeling procedures and constraints with parameter estimation,

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