

## عنوان مقاله:

Simultaneous Employment of Random Decrement and Floor Spectral Ratio Methods in Modal Identification of Structures

## محل انتشار:

یازدهمین کنگره ملی مهندسی عمران (سال: 1398)

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## خلاصه مقاله:

The random decrement method (RDM) is a process by which the free vibration response of a structure can be separated from the total response generated by random Gaussian white noise. This free vibration response can be used to estimate the natural frequency and damping ratio of the structure under investigation. Floor spectral ratio (FSR) method is applied to obtain the natural frequencies of structures using recorded random signals on the last floor. The principle is to obtain the transfer function of the structure using floor and base signals. These recorded random signals can be ambient vibrations due to natural sources or human activities. In order to obtain the modal frequencies and modal damping ratios of a structure using RDM, a signal processing procedure must be performed. Frequency filtering is an important part of the procedure. The signal processing parameters must be chosen properly to achieve reliable estimations of modal parameters. The signal processing parameters are usually picked by iterations and referring to the experience of the interpreter engineer. As a result, lack of some criteria to choose these parameters is felt. In this conference paper, a procedure has been proposed in which the random decrement and floor spectral ratio methods are used simultaneously. The signal processing parameters required in RDM are obtained by interpreting FSR spectra and signals recorded on all floors of the structure. In order to investigate the accuracy and efficiency of the proposed procedure, many synthetic signals with statistical characteristics similar to ambient vibrations are generated. On the other hand, a few structures with known modal parameters are simulated and loaded with the generated signals. Then, the responses of the structures are obtained by modal expansion method and numerical methods at several degrees of freedom or floors. Applying the proposed procedure using the response signals, the accuracy of the estimations is studied and compared with the real values. The results represent acceptable accuracy for the estimated parameters and the procedure is verified to be used in modal identification of many structures. Furthermore, unlike past research assumptions, it is observed that some modes are identified using FSR spectra of other floors than the last one.

## کلمات کلیدی:

Modal Identification, Random Decrement Method, Floor Spectral Ratio, Synthetic Signals

## لینک ثابت مقاله در پایگاه سیویلیکا:

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