

Experimental Modal Analysis of Reinforced Concrete Square Slabs

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Abstract : The aim of this paper is to perform experimental modal analysis (EMA) of reinforced concrete (RC) square slabs. EMA is the process of determining the modal parameters (Natural Frequencies, damping factors, modal vectors) of a structure from a set of frequency response functions FRFs (curve fitting). Although experimental modal analysis (or modal testing) has grown steadily in popularity since the advent of the digital FFT spectrum analyzer in the early 1970's, studying all members and materials using such method have not yet been well documented. Therefore, in this work, experimental tests were conducted on RC square specimens (0.6m x 0.6m with 40 mm). Experimental analysis is based on freely supported boundary condition. Moreover, impact testing as a fast and economical means of finding the modes of vibration of a structure was used during the experiments. In addition, Pico Scope 6 device and MATLAB software were used to acquire data, analyze and plot Frequency Response Function (FRF). The experimental natural frequencies which were extracted from measurements exhibit good agreement with analytical predictions. It is showed that EMA method can be usefully employed to perform the dynamic behavior of RC slabs.

Keywords : natural frequencies, mode shapes, modal analysis, RC slabs

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