

ON TEST PROCEDURE OF DETERMINING THE DYNAMICAL CHARACTERISTICS OF STRUCTURE

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Abstract

For establishment of antiseismic design, it is one of the most important problems to evaluate dynamical characteristics of structure. The method of determining the dynamical characteristics of actual structures by the seismic test is considered as one of effective approach to this problem, but practical procedure of the test and evaluation of the results must be precisely examined in the application of this method concerning with object of the test and also with type of the structure.

In this paper discussed are the various questions on the test for dynamical characteristics of actual structures in the case of the forced vibration test and the measurement of micro-tremors of structure. And then, regarding to the natural periods and critical damping ratios that are considered as basic quantities of the structure in elastic range, the method of determining these quantities are applied on the five story steel framed structure with rectangular plan.

From the results of the steady-state forced vibration test and of the measurement of micro-tremors of the structure, resonance curves, auto-correlation function, and spectral density are calculated. With respect to these numerical results, estimation of natural periods and critical damping ratios is discussed.

Some conclusions are pointed out as follows :

- 1) It should be careful for us to evaluate the reasonable value of critical damping ratio from the resonance curve because of the various test conditions.
- 2) The exact values of lower natural periods can be easily computed from spectral density, but some correction for the computation procedure of spectral density should be required to evaluate critical damping ratio from spectral density as to input and output.