

GEOTECHNICAL MODEL FORMULATION OF A SITE
FROM MICROTREMOR GROUND MOTION

by

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INTRODUCTION

The main problem in the analysis of the influence of local soil conditions upon the earthquake effect is the formulation of a corresponding geotechnical model of a site representing actual physical-mechanical and geometrical soil properties which may influence the amplitude-frequency content of earthquakes. The problem of the formulation of a geotechnical model depends mainly on the complexity of local soil conditions.

In this report an information of the possibility of a geotechnical model formulation from microtremor ground motion is presented.

CONCLUSIONS

It can be said with certainty that microtremor ground motion are still not enough investigated and explained. However, recent investigations give a possibility of making definitive conclusions concerning the application of microtremors for engineering purposes.

In the analysis of the influence of local soil conditions upon earthquakes occurred recently in Yugoslavia (Skopje-1963; Debar-1967; Leskovac-1968 and Banja Luka-1969), a good correlation between these earthquake intensities and the structural damage with ground predominant periods defined by microtremor measurements is shown, and the dependence of the microtremor predominant periods upon local soil conditions is defined. The results obtained enable application of microtremors for formulation and verification of a site geotechnical model.

In applying microtremors for formulation and verification of a geotechnical model of a site, the following should be taken into account: the ground structure filtrates microtremors originated by different sources on the surface. Therefore, more or less microtremors always contain vibration periods of the sub-surface layers; the periods caused by microtremor sources are in most cases variable and depend on the properties of excitation sources; the shear wave velocities are the most dominant in microtremor ground motion.

Using the analysis of microtremor predominant periods obtained by Fourier spectral analysis, predominant periods of the ground and the corresponding geotechnical model are defined. Such a defined geotechnical model can be verified by the relation $T_0 = 4H/V_s$, where T_0 is the ground predominant period obtained by microtremor measurements, H is the thickness of the surface layer to certain depth defined by boring tests or by geophysical methods when deeper layers are involved, and, V_s is the average shear wave velocity defined by Cross-Hole or Down-Hole methods.

For such a formulated and verified geotechnical model, necessary physical-mechanical parameters are defined and its adequate mathematical formulation is carried out, depending on the method used for the analysis of the influence of local soil conditions upon the earthquake effect.

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