

SUMMARY

The present thesis under the title “The effect of inhomogeneities in the seismic response of the soil surface” was done during the Master program “Earthquake Resistant Design of Constructed Works” at the Aristotle University of Thessaloniki by civil engineer John Fountoukidis.

The purpose of the present master’s thesis is research on the seismic response at the soil surface because of inhomogeneities at various depths. It’s important to refer that this thesis does not deal with the inhomogeneity’s tense and response, but exclusively with its effect in the seismic behavior of soil surface. The types of inhomogeneities are:

- a) circle inhomogeneity without the existance of material inside
- b) circle inhomogeneity with a much harder material than the surrounding ground.

The analysis in order to present the results has been made to one-layered soil as well as to two-layered soil, either softer or harder than the present one.

One type of load condition has been researched which is horizontal sinusoidal stimulation at the bedrock.

The load condition has to do with the introduction of a time-history analysis and the results taken are refered to the response of the surface in relation to time.

The program ANSYS 8.0 was used to perform the analysis and for the evaluation of results.

An introductive presentation conserning the soil profile takes place in the first chapter of this thesis. A more detailed reference takes place in the way of discretization and additionally in the characteristics of the elements used for its simulation.

In the second chapter of the project we attempt to clarify the profile’s accuracy through some simple analysis. Its results are compared to closed theoritical solutions. The above comperisons concern

- a) Verification having to do with the fountamental period of the soil profile
- b) Calculation of the time required for the shear waves arrival
- c) Verification of the vibration’s amplitude at the free field surface
- d) Lamp’s problem

In the third chapter a range of linear elastic analysis of the soil profile takes place using as load, time-histories of sinusoidal form, which is applied in the bedrock. During the results taken it’s important to pay attention to the parameters related to the inhomogeneities at various depths and their effection to the seismic reesponse of the soil surface.

In the fourth chapter takes place a presentation of basic commands and operations of the program ANSYS, which were used for the simulation of soil profile, the import of load continions anmd the export of required results.

The thesis is accomplished with the appendix which includes simple examples so the user be able to accustom with the use of the program ANSYS.