Vibrations of Buildings on Soft Soil

The effect of soil-structure interaction on vibrations of buildings was first studied as early as in 1940 and since then became a classical problem for civil engineering. Starting with early studies it had become clear that this interaction changes the natural periods of the building vibration and introduces effective damping caused by radiation of elastic waves into the soil. Both these effects are of high significance for assessment of the level and the frequency content of the structural vibrations.

Toughening requirements to the



vibration annoyance in the building industry along with rapidly growing demands of the computerchip factories to the vibration isolation made it necessary to estimate the level of the traffic and construction induced vibrations. These vibrations, having a relatively low power compared to the seismic-induced vibrations, may yet be perceptible and quite annoying for a building occupant and may severely reduce the living comfort. In the case of computer-chip factories, vibration isolation is a key question since even an occupant-induced vibration (just normal walking !!!) might effect quality of produced chips.

The main objective of this graduation project is to study the effect of the boundary conditions at the building-soil interface on the building response to an incident wave that is generated by either a pile driving or a train/car traffic. Parametric study of this effect would allow formulating certain restrictions on the use of simplified boundary conditions that are widely employed by engineers.



By carrying out the proposed project the student will get aquatinted with basic principles of elastodynamics, wave propagation in layered media, possible ways of description of the dynamic soil-structure interaction and the prosperous idea of the effective dynamic stiffness of the soil.

Date: Jan.18, 2002 Credits: 26 Professor Supervisor prof. A.C.W.M. Vrouwenvelder dr. A.V. Metrikine (k. 5.37)

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