# NONLINEAR APPROACH IN SOLUTION OF SEISMIC RESPONSE OF FOUNDATION

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Characteristic of all rigorous procedures is the idealization of the soil as elastic halfspace, with or without layers. But at the elastic-plastic wave propagation, where the mechanical characteristics of soil have been changed by intense seismic motion, this idealization is not sufficient. Relations between force - and deformation -quantities depend on more parameters than at microseismic processes. Various idealized models and analytical techniques are being used to represent a soil deposit and to evaluate its response, but whatever procedure is followed, it is necessary to determine the appropriate stress-strain and energy absorbing properties of the material in the deposit. In recognition of such needs, many attempts have been made in recent years to evaluate the dynamic properties of soil materials both in the laboratory and in the field. As a result, a comprehensive amount of information has been produced and published on this topic with progress having now advanced to the point where more reliable laboratory test data on undisturbed soil samples and more direct in-situ test data can be obtained in the design practice on an almost routine basis. Linear soil structure interaction analyses are very valuable; they cannot be a complete solution of the problem. The paper deals with problems of dynamic interaction of block foundation with subsoil in the case of horizontally acting force. Fundamental relations between basic soil properties and seismic response of block foundation are discussed. The solution is developed for sliding vibration of the foundation. The analysis is performed directly in the time-domain. For non-linear solution, experimentally determined dependencies of behavior of clays as well as dependencies established on a hysteretic behavior law using the classical Masing rule were used.

We solve differential equations which describe the vibration of block foundation and represents sliding vibration (without contemplating rotation of foundation). Solutions are made for linear and nonlinear cases for concrete types of foundation and theoretical examples of acting forces. Hyperbolic Hardin&Drnevich model and Ramberg-Osgood model for describing of nonlinear stress-strain relations of soil are used. Soil properties are assumed with whole hysteresis loop.

The importance of given solutions is that we can alternatively choose the values of the elastic-plastic stiffness. The solutions allow expressing of the displacements independent on the length of duration of force impulse and of the vibration of the system. The influence of soil nonlinearity is remarkable.