

AN EXPERIMENTAL STUDY OF THE CHARACTERISTICS
OF THE SUBGRADE REACTION IN THE POOR SUBSOIL

by

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In the response of the structure, the subgrade reaction and the damping of the foundation are very important factors. In the past, many researchers had studied theoretically these factors using the elastic theory and F.E.M. et al. It was very successful to analyze the subgrade reactions to the structure on the half space. But theoretical values of those of the foundation in the subsoil has not been obtained exactly because the boundary conditions are very complicated. Consequently, those are obtained by the experiment, but it is difficult to obtain independently those of three directions (vertical, horizontal and sliding directions). Especially in the poor subsoil, the subgrade reaction in the subsoil disturbed decrease extraordinarily.

We made an experimental study of the dynamic characteristics of the subgrade reaction to the structure on and in the subsoil. These characteristics are able to obtain simply by measuring the exciting force P , the earth pressure p , the displacement z and the phase angle φ , $\bar{\varphi}$ between P , p and z . At first, we studied the subgrade reaction to the model on the surface of the subsoil that had been obtained theoretically. (CASE-A) Secondly, we obtained those of the sliding and horizontal directions to the model in the subsoil. (CASE-B,C) After cutting the subsoil in the shape of the model, the model was set in the hole without disturbing the subsoil and pressed by the turnbuckles.

In the experiment of CASE-A, the subgrade reaction coefficient shows more decrease to the frequency ratio a rather than the theoretical values, and although the theoretical value of the damping is able to be shown approximately straight line, the experimental result has a peak at $a=0.80$, but the trends of those would agree approximately with theoretical values. Both factors decrease in the larger displacement, but the tendency to the frequency ratio is similar. But those would be influenced considerably by the shape of the cut surface of the subsoil, so we made the experiment after cutting the subsoil in the different shape. (NO.II) Those of NO.II were influenced with the cut surface rather than those of NO.I. The subgrade reaction of CASE-B are also influenced by the cut surface, but the tendency to the frequency ratio and to the amplitude of the displacement are similar to CASE-A, NO.II. The approximate tendency of CASE-B except for the influence of the cut surface would be similar to the subgrade reaction of vertical direction to the structure on the half space. The subgrade reaction coefficient of CASE-C is larger than CASE-A,B, and the damping factor is smaller, the tendency to the frequency ratio is slightly different.

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