矩形基礎の GROUND COMPLIANCE

小　堀　鐸　二

GROUND COMPLIANCE OF RECTANGULAR FOUNDATION

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Synopsis

The dynamic response of foundations on soil have attracted the interest of the earthquake engineers. This kind of problem has been almost confined to the circular foundation case, owing to the complexities of the mathematics involved, since E. Reissner investigated such a problem as the elastic half-space problem excited by circular surface loading in 1936. The study presented here is devoted mainly to the determination of the ground compliance when the loading area is rectangular, because foundations of structures are generally rectangular and seldom circular.

First of all, the formal solutions of the elastic half-space were obtained by using the multiple Fourier transform techniques under the various boundary loading conditions. Then the ground compliances of the rectangular foundation were shown in terms of doubly infinite integrals and their numerical evaluation represented the most difficult task of this study.

The numerical values of the ground compliances were evaluated by the special technique for integrating over the pole and by the digital computor. According to the numerical results in case of the vertical loading, the ground compliance was expressed as the real part f_{1v} and

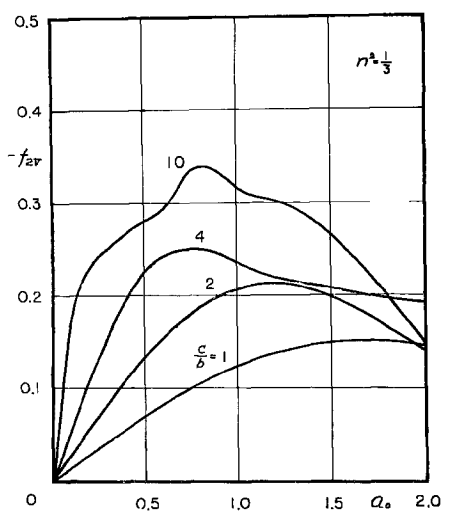

Fig. 1 Real part of the ground compliance in case of vertical loading.

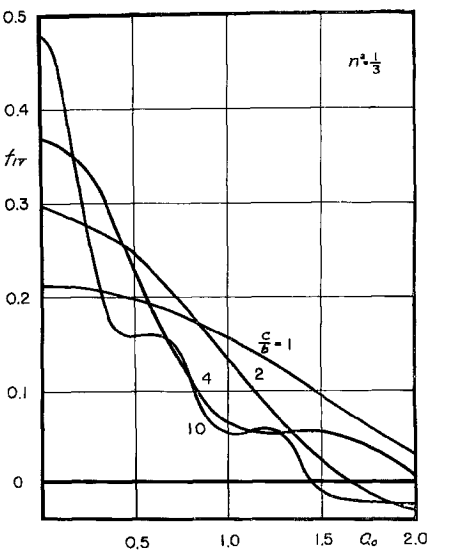

Fig. 2 Imaginary part of the ground compliance in case of vertical loading.

imaginary part f_{2v} in Fig. 1～Fig. 2 for the various values of the nondimensional frequency parameter a_0 and shape factor c/b of the rectangular foundation, where n^2 was ratio of the velocities of the shear and dilatation waves.

This research was carried out by Dr. W. T. Thomson, Professor of University of California Los Angeles, and author from 1961 to 1962. And the preliminary report of this study was published in the report No. 62-9 of the Department of Engineering, U.C.L.A., March 1962. The complete paper will be also reported by us in the Journal of Applied Mechanics recently.