

アースダムに関する若干の振動実験

島 山 直 隆

DYNAMIC TESTS OF MODEL EARTH DAMS

by Naotaka HATAKEYAMA

Synopsis

According to the results of field experiments, agar-agar model tests and some theoretical considerations, on which some paper have been already published by the author (1957, 1959 and 1962), the vibration should be considered to be a two-dimensional one, taking vertical as well as horizontal displacements into consideration. In addition, the tests of model dams, which were made of mixed cement, wheat flour and machine oil and fixed on the shaking table, showed the fact that the first cracks were developed perpendicular to the dam slope near the bases of dams and the second cracks followed the first and so on, until the dam body was broken down. The cracks in early stages would be caused by the tensile stresses near the surface of the dam.

Now, the tests of model dams, which were made of four kinds of materials composed of mixed sand, wheat flour and machine oil, were made so as to obtain some information about the breaking conditions of earth dams. In order that the results of the model tests should represent correctly the earthquake responses of the prototypes, it was necessary to consider the requirements of model similitude. According to the results of the similitude analysis for this case, it has been seen that the density of the materials should be larger on the model than on the prototypes, on the other hand its shearing strength should be smaller on the model than on the prototypes. It was difficult that all required model values have been achieved. The results of these tests were as follows:

(1) When the unit weight and the angle of internal friction of the materials of model dams became small and its cohesion became large, the first cracks were clearly developed perpendicular to the dam slope near the bases of dams.

(2) The larger the unit weight and the angle of internal friction of the materials of dams became, the easier the failure of a mass of the materials, which was called a slide, occurred.

(3) The vibrational intensity that the first cracks appeared on the surface of the dam body, increased with a decrease of the dam slopes.

(4) In the models of the same slopes, the first cracks appeared at the vibrational intensity that was proportional to the period.