FORCED VIBRATION SHAKING TABLE IN THE INSTITUTE OF EXPERIMENTAL STABILITY OF THE UNIVERSITY OF CHILE (FAC. OF ARCHITECTURE).

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ABSTRACT

The Stresses developed in the resisting members of an actual structure, subjected to the seismic disturbing forces, have not yet been accurately determined in designing practice.

Some measurements carried out with the Forced Vibration Shaking Table equipment (1) of the Institute, suitable for that purpose, are presented here. These measurements, performed in a mild steel simple frame model, show by means of acceleration spectrums the influence of ductility of materials in the stresses developed.

FORCED VIBRATION SHAKING TABLE

Fig. 1 shows a Forced Vibration Shaking Table whose movement reproduces, to any scale of amplitude and time, the ground movement, according to any recorded seismogram. A scale model of any actual structure may be erected on the table, reproducing, the said model, the mechanical characteristics of the structure, that is to say, dimensions, masses and stiffnesses.

A number of strain-gages are attached to the resisting members of the model where the stresses are to be measured. A recording oscilograph records, historically, the stresses and displacements developed in the model.

In Fig. 2 a mild steel simple frame model is shown, in which the displacements and stresses caused by the shaking movement of the table, according to the "El Centro" (California) Earthquake, N-S component, of May, 18th, 1940, seismogram, have been recorded.

Usually the structure model masses are hung from overhead supports, by means of suspension wires, in order to suppress the load in the columns, but letting the horizontal forces act freely.

In Fig. 3, Curve A shows an acceleration spectrum of the seism corresponding to Fig. 2, where the stresses in the materials do not exceed the elastic limit. Curve B shows the same spectrum where the stressed surpase the elastic limit.

CONCLUSIONS

1.- The Forced Vibration Shaking Table provides an effective and workable way to determine the stresses and displacements developed in a structure model, subjected to shakings reproducing earthquake movements.

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2.- The Forced Vibration Shaking Table technics permits to investigate the stress distribution in the elastic as well as in the elasto-plastic state of materials of any structure model.

3.- The influence of the elasto-plastic state of materials is of such importance that further research must be realized

REFERENCES

(1) Julio Ibañez.- "Earthquake-Proof Design of Structures in the "Instituto de Estabilidad Experimental" de la Facultad de Arquitectura de la Universidad de Chile". Proceedings of the First Argentine Symposium on Earthquake Engineering. (On Print)

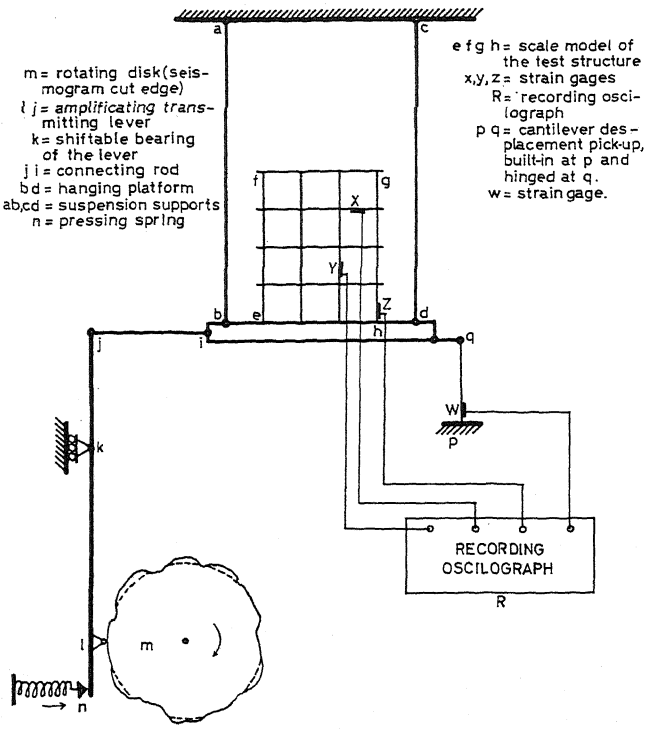

FIG 1.- FORCED VIBRATION SHAKING TABLE

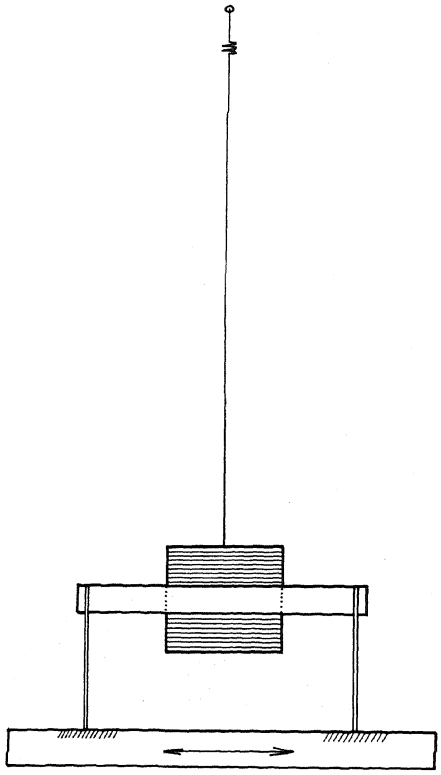

FIG.- 2

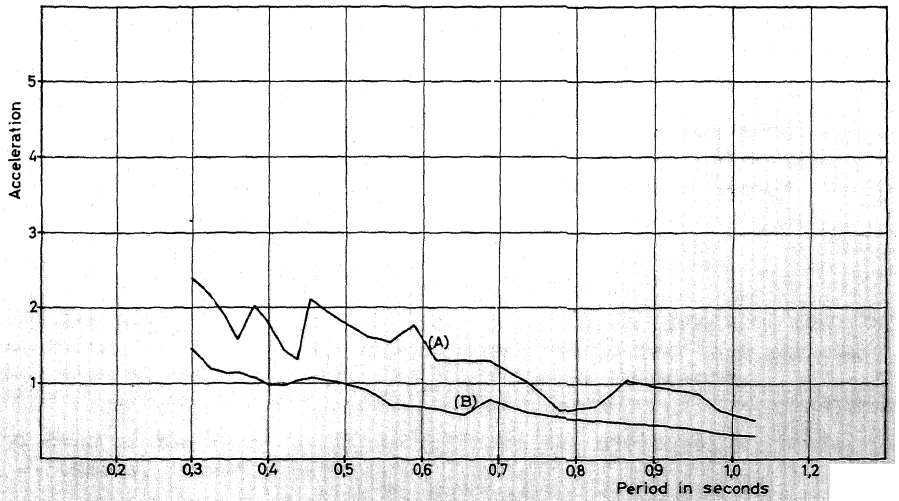

FIG 3.- ACCELERATION SPECTRUM.- EL CENTRO, CAL., EARTHQUAKE, MAY 18 1940.