

INTRODUCTION OF LABORATORY

— Okamoto Laboratory —

Okamoto Laboratory is making researches on the earthquake resistant structure in civil and building engineering.

Our project can be divided into the following three parts: 1) studies on characteristics of the earthquakes for designing of structures, 2) studies on dynamic behavior of the structure during earthquake— earthquake observation in site and dynamic tests on model in the laboratory, 3) studies on dynamic characters of the structural materials including the ground-soil and the rock.

On the first subject, we have continued the observation of earthquakes at the alluvial district with thick soft layer, the rock region and the landslip district. For the examples, in the case of observation at the inside of the bank of "Arakawa" River in Tokyo, seismometers were set at the five elevations from the ground surface to the hard base layer at 28 meters depth. We have obtained many earthquake records including the Niigata Earthquake. In the rock region, observation has been made in the vertical shaft of the underground electric power station 67 meters deep. Some of these records have been analyzed and published.

Further, at Koto-ku in Tokyo, where thickness of soft layer is 50~60m, 5 acceleration seismometers were buried in the vertical boring hole and in the steel pile with a diameter of 609 mm and a length of 51 meters, in parallel to the boring hole and respectively at the corresponding depth.

We have continued observation of tremors for the purpose of study the relationships between earthquake and landslip, near the Dosan Line of J.N.R. in Shikoku Island, where the landslip was frequently occurred.

On the second subject, earthquake observation in site has been made at the dam and in the tunnel way constructed in the soft layer.

Dams surveyed are the "Tonoyama" arch dam, the "Miboro" rockfill dam, the "Sannokai" earth dam, the "Tagokura" gravity dam, etc.

Further, we have observed the earthquake in the tunnel way for the electric power cable, at Koto-ku in Tokyo, which was constructed by shield method in the soft layer with a thickness of about 60 meters. At the well foundation of piers of the "Arakawa" bridge of J.N.R. in Tokyo, seismometers were also set and observation has been continued.

As for the experimental studies, the following tests are continued. Using the vibration exciter system with electro-magnetic exciters, which was developed in Okamoto laboratory, the vibration tests of arch dam models of the real dam existed or in planning, for example, the "Yahagi" arch dam, are being executed now in both conditions of full reservoir and empty. Relating to studies of dynamic behavior of pipe lines constructed in the soft layer, we made the model of gelatine and plastic pipe, which correspond to the soft layer and the pipe line respectively, and the vibration tests were carried out.

In addition, three dimensional vibration model tests of earth dam which is made of agar-agar have been executed. Lately we have begun the photo-elastic vibration model test of fill-type dam.

On the third subject, studies on the failure of reinforced concrete structure and on the dynamic behavior of soil in high speed loading condition are continued.

Members of Okamoto Laboratory are:

S. Okamoto (Prof.), C. Tamura (Asso. Prof.), T. Okada (Lecurer), C. Fujiwara (Research Fellow), K. Kato (Assistant), S. Morichi (Assistant), M. Tsukada (Research Assistant), T. Ono (Research Assistant), T. Sukegawa (Research Assistant), T. Tanuma (Research Assitant), K. Yokō (Technical Assistant), A. Yajima (Technical Assistant) and two graduate students.

All members are very good arranged round Prof. Okamoto and making the active research works in this field.

Finally, the selected papers published for these several years are listed up as follows;

- *S. Okamoto, K. Kato and M. Hakuno:
On Seismic Force Acting on the Lining of the Tunnel.
Proc. of Japan National Symposium on Earthquake Engineering, 1962.
- *S. Okamoto and M. Hakuno:
Studies on Non-linear Vibration of the Ground.
Proc. of Japan National Symposium on Earthquake Engineering, 1962.
- *S. Okamoto, K. Kato and M. Hakuno:
On the Seismic Force Acting on Structures under the Ground.
Vo. 92, Trans. of J.S.C.E. April, 1963.
- *S. Okamoto, M. Hakuno, K. Kato and M. Otawa:
On the Vibration of Arch Dam, Especially its Vertical Extentional Vibration.
Vol. 100, Trans. of J.S.C.E. Dec. 1963.
- *S. Okamoto and M. Hakuno:
Contact Pressure and its Vibration of the Sand Particles under Dynamic Loads.
No. 10, Vol. 12, Soil and Foundation, Oct. 1964.
- S. Okamoto, N. Yoshida, K. Kato and M. Hakuno:
Dynamic Behavior of an Arch Dam during Earthquakes.
No. 2, Vol. 14, Report of the Institute of Industrial Science, Univ. of Tokyo.
- S. Okamoto, M. Hakuno, K. Kato and M. Otawa:
Observation of Earthquakes on an Arch Dam and its Abutement.
Vol. 112, Trans. of J.S.C.E. Dec. 1964.
- S. Okamoto, N. Yoshida and K. Nakayama:
Observation of Dams during Earthquakes.
R. 15, Q. 29, 8th International Congress on Large Dams, 1964.
- S. Okamoto, M. Hakuno, K. Kato and F. Kawakami:
On the Dynamical Behavior of an Earth Dam during Earthquake.
Proc. of 3rd W.C.E.E. Jan. 1965.

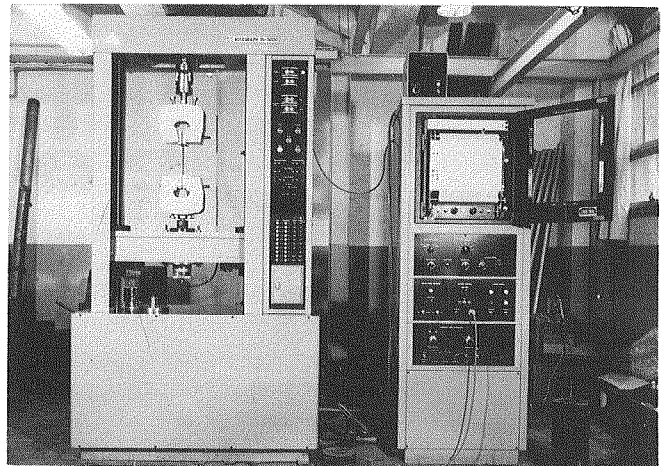
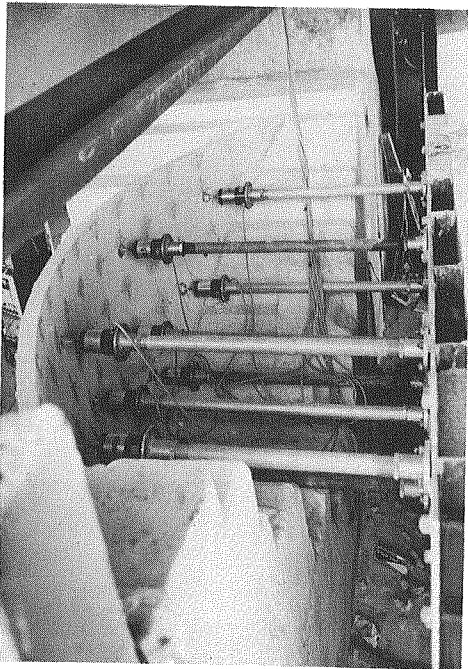
*S. Okamoto:

On the Present State of Studies on Earthquake Resistant Engineering.
No. 11, Vol. 17, Seisan Kenkyu, Nov. 1965.

As to the papers presented after 1966, please see "LIST OF RECENT PAPERS BY MEMBERS OF THE CENTER".

In operating the electro-magnetic exciters "Seiken-shiki", stresses on both faces of upstream and downstream during vibration was investigated in both conditions of full reservoir and empty.

Universal Testing Machine named "Auto-Gragh" in Japanese is able to make many unique tests that is, constant loading tests in high or low speed, repeating loading tests with various shape: sinusoidal, triangular and so on, and other tests.



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- * : In Japanese
J.S.C.E. : Japan Society of Civil Engineers
W.C.E.E. : World Conference on Earthquake Engineering
Seisan Kenkyu : Bulletin of the Institute of Industrial Science, Univ. of Tokyo
A.I.J. : Architectural Institute of Japan