

INTRODUCTION TO LABORATORY

---- Earthquake Resistant Mechanical Structure Design Group ----

Members:

- A. Watari, Professor, Dr. Eng.
- H. Shibata, Assc. Prof., Dr. Eng.
- H. Sato, Assc. Prof., Dr. Eng.

This group has been engaged in developing the earthquake resistant plant design since 1958 under cooperations with Engineering School, University of Tokyo and other institutes.

The members have developed the fundamental theories for the earthquake response analyses of low-damping elastic systems, pipings, columns and vessels which are installed on foundations or in buildings, also done the design procedure of earthquake resistant plants.

Prof. Watari and his Laboratory on Mechanical Dynamics and Earthquake Resistant Mechanical Structures is conducting the projects of this group. This time the activity of Prof. Watari's Laboratory is introduced.

Members:

- A. Watari, Professor
- S. Ohno, Assc. Prof., Dr. Eng.
- T. Sugimoto, Research Associate, Dr. Eng.
- M. Kuroda, Research Associate, Dr. Eng.
- S. Kyo, Research Fellow, Dr. Eng.
- T. Tateishi, Assistant
- M. Nishiyama, Assistant
- H. Kurabayashi, Technical Assistant

Researches on the mechanical vibrations and earthquake resistant mechanical structures are made in the laboratory. The details are as follows:

(1) Study on Non-linear Vibrations

Theoretical and experimental analyses have been made on mechanical systems with non-linear restoring force and damping, especially on frictional vibration and other self-excited vibrations in machine tools and rotating shafts.

(2) Study on Vibration Absorption and Prevention

The characteristics of vibration absorbers, shock absorbers and vibration preventive mountings of machines are studied theoretically and experimentally, in order to solve vibration problems in the actual cases.

(3) Research on Dynamical Problems in Automobiles

Dynamical problems as to the dynamical stability, vibration and noise of vehicles have been analysed to obtain good riding quality of automobiles.

(4) Research on Earthquake Resistant Mechanical Structures

Vibration characteristics of machines and the dynamical response of mechanical structures to earthquake have been analysed, and the design method to resist earthquake has been studied.

(5) Study on Elastic Vibration of Curved Plate

Studies on the flexural vibration of curved plates have been done for the purpose of reducing the noise of machines caused by resonance of thin plate structures.

Selected papers published for these several years are as follows:

- (1) A. Watari and T. Sugimoto; "Vibration Caused by Dry Friction", Bulletin of JSME, Vol. 7, No. 25, 1964.
- (2) A. Watari; "Research on the Motion of Automobiles", Report of the Institute of Industrial Science, Univ. of Tokyo, Vol. 14, No. 3, 1965.
- (3) A. Watari; "Cornering Motion of an Automobile", Proc. of the 11th Congress of FISITA, B14, 1966.
- (4) H. Shibata, A. Watari, S. Fujii, M. Iguchi, H. Sato and T. Shigeta; "Aseismic Design of Piping Systems in Power and Chemical Engineering Plants", JSME 1967 Semi-International Symposium, 1967.
- (5) A. Watari, H. Shirai, K. Sunaga and S. Iida; "An Evaluation of a Motor Vehicle upon Steering", Proc. of the 12th Congress of FISITA, 2-18, 1968.
- (6) A. Watari, E. Adachi, K. Miki and M. Nagai; "Elastic Vibration Analysis of Automobile Body Structure", 1st International Conference on Vehicle Mechanics, No. 12.312, 1968.
- (7) A. Watari; "An Analysis of Automobile Vibration Including Windup and Shake", Trans. of JSME, Vol. 71, No. 596, 1968.
- (8) T. Sugimoto; "The Chatter Vibration of Lathe Tool", Trans. of JSME, Vol. 26, No. 169, 1960.
- (9) T. Sugimoto; "Chatter Vibration in Turning", Trans. of JSME, Vol. 28, No. 190, Vol. 29, No. 199, No. 202, 1963.
- (10) M. Kuroda; "Vibration Analysis of a Multi-Degree-of-Freedom System by Division", Trans. of JSME, Vol. 32, No. 236, 1966.

JSME = Japan Society of Mechanical Engineers