

Introduction to Laboratories

- Structural Mechanics Group -

In the activities of ERS, this group has been engaged in researches on the earthquake resistant design of building structures.

Tanaka and Takanashi Laboratory

Members;

H. Tanaka, Professor, Dr. Eng.
K. Takanashi, Associate Professor, Dr. Eng.
T. Shigenobu, Research Assistant, M. Eng.
K. Udagawa, Research Assistant, M. Eng.

Activities;

Research activities of this laboratory are performed mainly concerning stress analysis of elastic and plastic frames, elastic and plastic stability of structures and design methods of steel structures. Investigation on the dynamic behaviors in the elastic-plastic range of steel members are now planned. The following items of researches have been carried out;

- 1) Methods of analysis and design of frames, such as limit analysis, shakedown analysis, minimum weight design,
- 2) Theoretical and experimental investigation on the plastic buckling of steel plates,
- 3) Theoretical and experimental study on the strength of beams to column connections of steel structures subjected to horizontal seismic loads.

Selected Papers;

- 1) Tanaka, H., "Plastic Deformations of Square Portal Frames under Horizontal Impact", Trans. of AIJ, Vol. 67, Feb. 1961
- 2) Tanaka, H., "Automatic Analysis and Design of Portal Frames," Report of IIS, Vol. 12, No.3, Sept. 1963
- 3) *Tanaka, H., "A Note on Theory of Uniqueness and Stability in Elastic-Plastic Structures," Trans. of AIJ, No. 88, Aug. 1963
- 4) *Tanaka, H., Lin, Y. C. and Fukushima, A., "Plastic Deformation of a Square-Portal Frame Subjected to a Horizontal Blasttype Impact," Trans. of AIJ, No. 92, Nov. 1963
- 5) *Tanaka, H. and Takanashi, K., "Study on the Limitation of Width-Thickness Ratio in the Plastic Hinge," Trans. of AIJ, No. 96, 99, 107, 133, 136

- 6) *Tanaka, H., "Slope Deflection Method for Frames with Connections Having a Web deformed by Shear Force," Trans. of AIJ, No. 109, March 1965
- 7) Tanaka, H., "Limit Analysis of Beam-Column Connections Subjected to Anti-symmetrical Bending," Recent Researches of Structural Mechanics, Uno-Shoten, April 1968
- 8) Tanaka, H., Fukushima, A. and Lin, Y. C., "Limit Analysis of Beam-Column Connections," Trans. of AIJ No. 148, June, No. 149, July 1968

Kawamata Laboratory

Members;

- Y. Tsuboi, Professor Emeritus, Dr. Eng.
- S. Kawamata, Associate Professor, Dr. Eng.
- Y. Hangai, Research Assistant, M. Eng.
- S. Shioya, Research Assistant
- N. Tanaka, Technical Assistant

Activities;

Research activities of this laboratory are related to structural mechanics particularly in connection with structural design of large span buildings and pressure vessels. Contributions to the earthquake resistant structure have been made in the field of stress analysis and the method of structural design. The research in the following items has been carried out in relation to the earthquake resistant structure;

- 1) Theoretical analysis of shell structures(shell roofs and pressure vessels) subjected to horizontal seismic force,
- 2) Theoretical and experimental study on vibration characteristics of shells and hanging roofs,
- 3) Finite element analysis of thick walled concrete pressure vessels,
- 4) Theoretical and experimental investigation on aseismicity of reinforced concrete wall constructions.

Selected Papers;

- 1) Tsuboi, Y. and Kawaguchi, M., "On Earthquake Resistant Design of Flat Slabs and Concrete Shell Structures", 2WCEE, 1960
- 2) Tsuboi, Y. and Akino, K., "Theories and Applications of Antisymmetrical Bending State for Spherical Shell and Cylindrical Shell", Report of IIS Vol. 11, No. 2, Sep. 1961

- 3) *Tsuboi, Y. and Kawamata, S., "Approximate Evaluation of Natural Frequencies for Lateral Vibrations of Non-shallow Spherical Shells", Trans. of AIJ No. 83, March 1963
- 4) *Tsuboi, Y., et. al., "Reexamination Studies on the Aseismic Property of Reinforced Concrete Shear-Wall Structures", Trans. of AIJ, Sep. 1965
- 5) Tsuboi, Y., Kawamata, S. and Shioya, S., "Application of Finite Element Method to Non-symmetrical Problems of Solids of Revolution", Bull. of ERS, No. 2, Dec. 1968

H. Tajimi, Research Fellow, Dr. Eng. (Prof. Nihon University)

Activities;

Studies are principally concerned with the earthquake engineering. Special interests are given to

- 1) Earthquake resistant design of nuclear power facilities,
- 2) Building-soil interaction,
- 3) Probabilistic approach of earthquake response problems.

Selected Papers;

- 1) *Tajimi, H., "Basic Theories on Aseismic Design of Structures," Report of IIS, Vol. 8, No. 4, March 1959
- 2) Tajimi, H., "A Statistical Method of Determining the Maximum Response of a Building During an Earthquake," Proc. of 2WCEE, 1960
- 3) Tajimi, H., Ohmura, T., Uchida, T and Akino, K., "Observed Vibrations of a Nuclear Reactor Building During Some Weak Earthquake," Proc. of 3WCEE, 1965
- 4) Tajimi, H. and Ishimaru, S., "An Experimental Study on the Maximum Response of Simple Linear Structures to Random Earthquake Inputs," Trans. of AIJ. No. 110, Sept. 1965 and No. 128, Oct. 1966
- 5) Tajimi, H., "Dynamic Analysis of a Structure Embedded in an Elastic Stratum," Proc. of 4WCEE, 1969