



Kiyoshi Nambu

Kiyoshi Muto

1903-1989

By Joseph Penzien And George W. Housner

KIYOSHI MUTO, professor emeritus of the University of Tokyo, world-renowned teacher, researcher, and practitioner in the field of architectural engineering, died on March 12, 1989, at the age of eighty-six.

In recognition of his leadership role and many unique contributions in the field of earthquake engineering, he was elected foreign associate of the National Academy of Engineering in 1978.

Professor Muto was born on January 29, 1903, in Ibaraki Prefecture, Japan. Upon graduation from the Tokyo Imperial University (former name of the University of Tokyo) in 1925, he joined its faculty in the Department of Architecture, where he advanced rapidly to the rank of professor at the age of thirty-two. Having been greatly influenced by Japan's Great Kanto earthquake of 1923, he devoted thirty-eight years (from 1925 to 1963) as a member of the faculty developing and teaching the principles and procedures of earthquake resistant design, including the internationally known D-method used by engineers in many seismic regions of the world. Recognizing the importance of experimental verification of structural performance, he was instrumental in the development of a two-thousand-ton testing machine in 1958; and, to advance dynamic analysis capability, he developed a seismic response analyzer in 1960. Professor Muto served in various administrative roles while at the university,

including trustee of the University Senate (1958-1960) and dean of the Faculty of Engineering (1960-1962). His former students, in turn, became eminent engineers and professors of engineering, so his influence has extended to the third and fourth generations.

Upon his retirement from the University of Tokyo in 1963, Professor Muto became executive vice-president of the Kajima Corporation, a position he held until 1977; and, in 1965, he established the Muto Institute of Structural Mechanics, Inc., serving as its president until his death in 1989. While affiliated with these firms, he continued his earlier leadership role in the development of seismic resistant designs. His special studies on the nonlinear seismic response of high-rise buildings in the early 1960s led to the acceptance and construction of many such structures in Japan, the first of which was the Kasumigaseki Building in downtown Tokyo. With his continuing guidance during this period of development, Japan's building standards on structural design and analysis were rapidly modernized; and, with his invention and introduction of the reinforced concrete slitted-shear-wall construction, the seismic performance of such structures was greatly enhanced. In addition to his many outstanding contributions to the development of seismic-resistant high-rise building construction in Japan, Professor Muto made similar contributions to the development of its nuclear power plant construction through improving design and analysis methodologies and verifying performance by experimental means. Today the citizens of Japan are quite confident that such structures of modern design will perform satisfactorily during future earthquakes. Much of this confidence is the result of Professor Muto's many contributions in earthquake engineering.

During his entire career, Professor Muto contributed greatly to the advancement of architectural and civil engineering through his participation in professional society activities, including technical committees, seminars, symposia, and national and international conferences. As a leader of such activities, he served as a member of the Science Council of Japan and as president of the Architectural Institute of Japan, 1955-1957, Japanese Society of Soil Mechanics and Foundation Engineer

ing, 1956-1958, Japan Concrete Institute, 1965-1967, International Association for Earthquake Engineering, 1963-1965, and the Japan Federation of Engineering Societies, 1975-1977. He also made major contributions through his numerous publications, including his five-book series entitled *The Aseismic Design of Structures*, Maruzen Co., Ltd. and through the U.S. patents Composites Building Structure and Walls, 3,736,712, June 5, 1974; Supporting Structure for Pressure Vessel for Nuclear Reactors, 3,841,593, October 15, 1974; and Process for Reinforcing Reinforced Concrete Post, 4,071,966, February 7, 1978.

His awards and honors include his membership in the Japan Academy; Imperial Prize from the Japan Academy, 1964; Commendation by the Minister of State for Science and Technology, 1968; Medal with Purple Ribbon, 1968; International Award of Merit in Structural Engineering from the International Association of Bridge and Structural Engineering, 1976; Order of Culture, 1983; and Grand Cordon of the Order of Sacred Treasure.

In the conduct of research and development work at the Muto Institute of Structural Mechanics, Inc., Professor Muto gave major responsibility to very talented young engineers who considered it an honor to work for him. He personally supervised their work, demanding and receiving the highest levels of performance. Whenever they prepared papers and slides for conference presentations, he would closely check every detail, requiring modifications until totally satisfied. Preconference rehearsals would then be carried out and, at the conferences, he would usually sit in the center front row to observe their final performances; thus, they were more worried about satisfying Professor Muto than the attendees in general. He, of course, awarded them for their fine performances; they, in return, revered him for his guidance.

Although Professor Muto was extremely busy with his professional activities, he found time for a variety of hobbies that he enjoyed immensely. In his early years as a university student, he developed a strong interest in sports, playing catcher on the baseball team and skiing on skis designed and made by himself. Later, golf became his favorite sport, playing until the age of

seventy-eight on many courses around the world, including Pebble Beach and Spy Glass Hills in the United States. During these years, he also loved to watch professional baseball games and Sumo wrestling at the stadiums and on television. His other hobbies included growing his own orchids, which he did until his hothouse burned down, and working with the inner mechanisms of cameras.

