



Professor Theodore H. H. Pian (1919 – 2009)

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Theodore Pian, former AeroAstro professor, 90

Theodore H.H. Pian, who taught in MIT's Department of Aeronautics and Astronautics for more than 40 years and was a pioneer in the stress analysis of materials in aircraft and other structures, died on June 20 in Cambridge after a long illness. He was 90.

"To me he exemplified a professor's professor," said James Mar, professor emeritus of aeronautics and astronautics. "He counseled students, he did research that contributed to the theoretical underpinnings for the massive computer programs that are routinely used for structural analysis, he created subjects for undergraduates and graduate students, he was respected by his peers and his department was always self-effacing."

Pian was born in Shanghai, China in 1919, and earned a bachelor's degree in engineering from Tsing Hua University in Beijing. After working in the Chinese aircraft industry in the early years of World War II, he moved to the United States in 1943, and earned an SM from MIT's AeroAstro department in 1944 and a ScD in 1948.

Pian quickly progressed at MIT from AeroAstro teaching assistant and research associate to become a full professor of aeronautics and astronautics in 1966. He also gave lectures at 46 universities in the United States and at 55 universities in China, Japan, India, Israel, Germany, the United Kingdom, Canada, and other countries. He retired in 1990.

Always interested in foreign aerospace industry developments and his foreign students at MIT, Pian was also a visiting professor at 10 universities overseas during his career. He was an honorary professor at several leading engineering schools and aeronautical institutes in China.

"Ted Pian was a pioneer in the field of computational methods for structural analysis," said Paul Lagace, professor of aeronautics and astronautics, who was Pian's student before becoming one of his colleagues in the department. "His work helped lay the foundations on which many of today's operational techniques are built. A number of his thesis students who worked directly with him on this development work are key contributors to this field throughout the world today."

Pian wrote more than 200 professional papers and wrote or edited several books in the field of finite element method, a problem-solving technique that, among other things, allows engineers to create simulations that show in great detail where a structure might bend or twist. He pioneered analytical techniques that are used for many types of mechanical calculation, such as deformation, stresses and strains, and fracture in aircraft and other mechanical structures. These methods are now used in the design, evaluation, and testing of metals and other materials to predict accurately their strength and performance. The applications of these methods range from bridges and large aircraft to precision-engineered optical, mechanical and electronic equipment.

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THEODORE H. H. PIAN, 1919–2009

Elected to the National Academy of Engineering (NAE) in 1988

“For pioneering research and continued development of hybrid finite element methods for the analysis of structures.”

BY PIN TONG (SUBMITTED BY THE NAE HOME SECRETARY)

THEODORE HSUEH HUANG PIAN, a prominent aeronautics and astronautics professor and researcher at the Massachusetts Institute of Technology (MIT), died of natural causes on June 20, 2009, at the age of 90. The scientific and engineering world will long remember Dr. Pian's innovative and inspiring contributions to the

fields of structure mechanics and finite element methods. Those of us who loved him knew him as a husband, father, brother, grandfather, uncle, colleague, mentor, and above all a friend.

His Career:

Dr. Pian was born in Shanghai on January 18, 1919, and raised in Tianjin, China. After finishing Nankai Middle School, he earned a bachelor's degree in engineering in 1940 at the Tsing Hua University in Beijing.

Engineering was not Dr. Pian's first choice of study. His daughter, Canta, said: "He wanted to major in architecture, but the Chinese knew that engineering was the key to the future of China. So he took the engineering exams. He was a stellar student. Engineering wasn't his first choice, but he was obviously a very creative person, and he applied that in his engineering career."

During World War II, Dr. Pian was employed as an aerospace engineer in the interior of China (Kunming and Chengdu) before continuing his studies in the United States in 1943. He received his master's degree at MIT in 1944. After serving in the U.S. Marine Corps in 1945, he reentered MIT in 1946, where he received his D.Sc. degree in 1948. Then he spent his entire professional career at MIT. He rose from teaching assistant and research associate in the Department of Aeronautics and Astronautics to full professor in 1966 and retired in 1990. He remained active in his field long afterward.

Dr. Pian was a deep and thorough thinker and an unassuming, brilliant researcher. He focused his research on analysis of aircraft structures, including elastic-plastic creep, shear lag, stresses, and bending of plates and shells, and pioneered the development of several finite element methods. He collaborated with me in applying variational methods to elasticity, plates, shells, and computational mechanics. His 1964 seminal article published in the AIAA Journal broke new ground for the hybrid and mixed finite element methods. His contributions to the understanding of structural mechanics and finite element methods are legendary and prolific. By the time he retired, he had penned more than 200 professional papers and his name has graced many more. He wrote or edited several books in the field of finite element methods. Many of the analysis techniques he helped develop are in wide use today.

Dr. Pian helped push the frontiers of finite element methods and computational mechanics. He had played a role in establishing computerized methods as a universal structural analysis tool replacing rule-of-thumb designs.

During his career through five decades, Dr. Pian maintained active collaboration with national and international scholars and researchers. He lectured at 46 universities in the United States, as well as at 55 universities in other countries, including China, Japan, India, Israel, Germany, Britain, and Canada. He also served as a visiting professor at 10 foreign universities and was named an honorary professor at several engineering schools and aeronautical institutes in China.

The students who obtained degrees from MIT and the postdocs and young collaborators who trained under his guidance not only came away with a sound technical foundation but were profoundly influenced by his humility, civility, patience, and perseverance. The inspiration from Dr. Pian benefited his colleagues and friends personally and professionally and in turn expanded the world's understanding of the finite element method.

Awards

For his outstanding contributions to the aerospace sciences, Dr. Pian received many honors during his career. He received the von Karman Memorial Prize with Dr. Pin Tong for outstanding contributions to aerospace

structural-material technology in 1974 and was given the Structures, Structural Dynamics, and Materials Award from the American Institute of Aeronautics and Astronautics (AIAA) in 1975. He was a member of the National Academy of Engineering and a fellow of AIAA. He was also named honorary member of the American Society of Mechanical Engineers, the highest honor bestowed by the society, and he was elected a foreign member of the Chinese Academy of Sciences.

The Man

In 1945, Dr. Pian married Rulan Chao, a Harvard graduate student he met while at MIT who is now a Harvard professor emeritus of East Asian studies and music. Her support and love contributed greatly to his achievements.

Dr. and Mrs. Pian opened their Cambridge home to many Chinese immigrants, visitors, families, and colleagues. They helped generations of Chinese students adjust to life in America. They mentored, entertained, hosted, and shared their home with students. They supported and nurtured Chinese student groups and were greatly interested and actively participated in student activities. Even after retirement, Dr. Pian continued to give Chinese graduate students advice, host memorable and lively Thanksgiving dinners, and provide students a gathering place over holidays and a regular place for an unscheduled drop by and unpretentious chat.

“He was extremely humble,” said his son-in-law Michael Lent, who recently came across his father-in-law’s collection of plaques and medals. “A lot of people would have built a glory wall and hung all this stuff, but he would be the last person to do that.” Dr. Pian kept his tucked away in the basement.

Dr. Pian was a kind gentleman, unassuming and thoughtful. His caring and support enriched the lives and launched the careers of many—his students, postdoctoral scholars, and young associates. Their genuine affection and admiration for him were reflected in their enthusiastic participation in the 1990 symposium in tribute to him for his retirement from MIT and at his 90th birthday party in 2008 at his home in Cambridge.

Dr. Pian is survived by his wife Iris Rulan Chao Pian, his daughter Canta of Washington, D.C., his son-in-law Michael Lent, his granddaughter Jessica, his brothers in Tianjin and Australia, numerous nephews and nieces, and a large extended family of accomplished scholars and professionals.

Good-bye

Ted Pian will be sorely missed as a colleague and a friend who always gave us encouragement and support. Though it is Pian’s lifetime achievements we will remember, it is his kindness that we will miss.

We grieve his passing and weep because we loved this kind and gentle man. We see his image standing on the top of a mountain with arms around his chest, gazing into the wind that brushes his hair, pondering better ways to approximate a continuum by discreet elements, and searching the new and wonderful places beyond the horizon.

May God bless Ted Pian, and may he rest in eternal peace. We shall carry on his example.

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