

STANFORD UNIVERSITY
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OFFICE OF THE PRESIDENT

MEMORIAL RESOLUTION

**JUAN CARLOS SIMO
(1952 - 1994)**

Juan Carlos Simo, Professor of Mechanical Engineering and Chairman of the Applied Mechanics Division, died in Madrid, Spain on September 26th, 1994 after a long illness. Juan, a native of Spain, was an internationally renowned expert on computational mechanics, a synthesis of physical insight, computer technology and advanced mathematical methods that has wide application in engineering analysis.

Juan received his bachelor's degree in civil engineering from the Universidad Politecnica in Madrid in 1976 and a master's degree in business administration in 1979 from the Escuela de Organizacion Industrial, also in Madrid. He continued his graduate studies at the University of California in Berkeley as a Fulbright Scholar. At Berkeley he received a master's degree in civil engineering in 1980 and a Ph.D. in civil engineering in 1982. In his Ph.D. dissertation, *Some Bifurcation Topics in Nonlinear Elastostatics*, performed under the direction of Professor James Kelly, Juan obtained fundamental solutions to design problems of base isolation systems used to protect large buildings from the destructive forces of strong earthquakes. Upon completing his Ph.D., Juan commenced postdoctoral studies at Berkeley under the direction of Professors Robert Taylor, former Chairman of the Department of Civil Engineering, and Karl Pister, former Dean of Engineering and currently Chancellor of the University of California at Santa Cruz. Juan also taught graduate courses at Berkeley and Stanford before being appointed assistant professor at Stanford in 1985. Juan received the Presidential Young Investigator's Award in 1987 and was promoted to associate professor with tenure in 1990 and to full professor in 1993. In 1994 Juan received the Humboldt Prize from the Alexander von Humboldt foundation.

By the time Juan came to Stanford he had already made fundamental progress on computational approaches to problems of solids and structures undergoing inelastic deformations and, in the process, he had established himself as a rising star. Juan revitalized a long tradition of activity in the mechanics of inelastic media in the Applied Mechanics Division by developing a graduate sequence in Theoretical and Computational Inelasticity which became his signature course. Each time Juan taught the course it was updated to include the latest research developments, much of which derived from Juan himself. It is generally conceded that Juan took the subject to a new level and he will long be remembered for the body of work he produced in this field. Two monographs, still to be published, summarize these endeavors: *Topics in the Numerical Analysis and Simulation of Plasticity, and Plasticity, Viscoplasticity and Viscoelasticity: Formulation and Numerical Analysis* (with T.J.R. Hughes).

Simultaneously, Juan did outstanding work in a number of other areas. He had an abiding interest in structural theories and nonlinear continuum mechanics. He developed formulations for nonlinear rods, beams, plates and shells undergoing large overall motions. As with all his work, he created excitement and presented results that attracted tremendous interest. Nonlinear beam formulations that would be applied to rather mundane, technical problems by most engineering researchers were used by Juan with tremendous flair and wit to simulate "flying spaghetti." Of late he focused on models for shell intersections and asymptotic methods for nonlinear shells.

He continued to work on fundamental aspects of continuum mechanics and Hamiltonian systems, work that began in collaboration with Professor Jerrold Marsden, a Norbert Wiener Prize recipient, at Berkeley. In the last few years, his interests were devoted to the development of time integration schemes that preserved fundamental conservation laws of Hamiltonian systems and decay inequalities of dissipative dynamical systems. He also made significant progress in the area of algorithms for coupled field phenomena, such as thermoplasticity and magnetohydrodynamics. Recently, he had turned his attention to localization of deformation and phase transition in solids, and he had begun to examine problems of incompressible fluid dynamics. In all these endeavors, fundamental nonlinear mechanics principles were embedded into numerical formulation. Throughout all his work one finds beautiful syntheses of mechanics and numerics.

Juan was a talented teacher and possessed incredible energy. He was a prodigious worker and had a number of outstanding graduate students. He put a tremendous amount of effort into guiding and nurturing their research and was truly dedicated to the process of Ph.D. education.

Despite his propensity for hard work, Juan was very human. He loved parties, good food and wine, baroque music, riding motorcycles and flying airplanes. As a young man in Spain, he ran with the bulls in Pamplona. He had a zest for life and was great fun to be around. He often held meetings with his graduate students in the Coffee House. He enjoyed travel, lectured extensively at conferences, hosted many prominent academic visitors, and collaborated with many outstanding researchers around the world.

Just prior to becoming aware of his illness, he had been involved in planning a party for close friends. The plans were cancelled after he became aware of the severity of his illness. When things temporarily stabilized, he urged that the party be held. The party was arranged and all present were aware of the gravity of his illness. Despite this, everyone had a wonderful time. Juan, in particular, seemed to really enjoy himself.

Shortly before Juan's death a conference was held in Palo Alto in honor of professor Robert Taylor's 60th birthday. Taylor was one of Juan's mentors, a very close friend and scientific collaborator. Juan was one of the prime movers behind the conference and desperately wanted to attend. Up until a few weeks before the conference he seemed determined to return from Spain, but he had become much too ill to travel. During the conference, a copy of the book prepared in Taylor's honor, to which Juan had contributed a paper, was express mailed to him. He apparently was very happy to see it.

Our dear friend and colleague Juan is gone and it is very hard for us to believe it and even harder to accept it. In a relatively short time he accomplished great things of lasting impact. Through his efforts he changed the fields in which he worked. The acknowledgment of his many published works through an enormous number of citations in the literature is a testament to the importance of his contributions and their lasting value.

We are burdened with the sadness that he died much too young. One can only guess at the amount of truly creative work he would have produced had he been able to continue. Nevertheless, he did accomplish many wonderful things, and he made a lasting impression on all those with whom he came in contact. We will miss him very, very much.

Juan is survived by his wife Constance Rylance. Their first child, Jonathan Carlos, is due in March 1995. Juan is the son of Ana Mary Muerza Amatriain of Madrid, Spain and Manuel Simo Perez de Guzman who is deceased. Juan is also survived by his brothers and sisters, Ana Simo Muerza of Madrid, Manuel Simo Muerza of Malaga, Gonzalo Simo Muerza of Madrid, Julio Simo Muerza of Fuengirola, Rosa Simo Muerza of Madrid and Fany Simo Muerza of Madrid.

The Applied Mechanics Division of Stanford University has established the Juan Simo Memorial Fund. The fund will support an annual award, the Juan Simo Memorial Prize, for outstanding achievement in computational mechanics. The award will be presented to a graduate student completing the doctoral program at Stanford. Contributions to the fund can be made through the Division.

Thomas J. R. Hughes
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