



*John H. Bogdanoff*

# JOHN L. BOGDANOFF

1916–2003

Elected in 1975

*“For leadership in the introduction of stochastic processes into mechanical and civil engineering analysis.”*

BY HENRY T.Y. YANG

**J**OHN “JACK” BOGDANOFF was a pioneer in basic mechanics, materials, dynamics, fracture and fatigue, and stochastic processes for solving large-scale, complex engineering problems. Born on May 25, 1916, in East Orange, New Jersey, he passed away on July 20, 2003, in West Lafayette, Indiana.

Jack obtained a B.S.M.E. from Syracuse University in 1938, an M.S. from Harvard University in 1939, and a Ph.D. from Columbia University in 1950. While at Columbia, he studied with Professor Raymond Mindlin. Jack’s stellar career began as a test engineer in engine performance, vibration and stress analysis, and advanced design at Wright Aeronautical Corporation in Woodridge, New Jersey, from 1939 to 1946. From 1946 to 1950, he was an instructor and assistant project engineer in civil engineering at Columbia University, where he taught courses in statics and dynamics and in vibration.

Most of Jack’s professional life was spent at Purdue University. Beginning in 1950, he was professor of engineering sciences; he taught courses in statics, dynamics, materials, vibration, elasticity and control systems, vectorial mechanics, analytical mechanics, and statistical analysis of engineering systems. During the 1950s, Jack and Professor Frank Kozin and a few other Purdue colleagues, formed the Midwest Applied Science Corporation (MASC). Their major project, the Land Locomotion Project,

for the U.S. Army Tank and Automotive Center in Warren, Michigan, involved the design of vehicle suspensions that could respond to vibrations caused by variations in ground height. Louis J. Cote, a colleague at Purdue, was a major collaborator on the project. MASC undertook many more projects until 1968. In 1962, Professors Bogdanoff and Kozin founded (and were co-directors) of the Center for Applied Stochastics, which was partially supported by a grant from the National Science Foundation (NSF). Principal investigators associated with the center were Wilbert M. Gersch, Anshel J. Schiff, and Arnold L. Sweet, all professors in the School of Aeronautics, Astronautics, and Engineering Sciences at Purdue. During this time, undergraduate and graduate courses were developed to introduce students to the concepts of probability and statistics. Research topics included stochastic differential equations, stochastic stability, metal fatigue, soil subsidence, system identification, column buckling, heat transfer, and fluid turbulence.

Jack was associate head of what was then called the School of Aeronautics, Astronautics, and Engineering Sciences from 1967 to 1971 and was head of the school from 1971 to 1972. Subsequently, he was a professor in the school, which was renamed the School of Aeronautics and Astronautics, until his retirement in 1986. In his 36 years at Purdue, Jack was instrumental in building the engineering and science program into one of the strongest programs in the world. He also made extraordinary contributions to the program in aeronautics and astronautics, which is now also one of the very best in the world.

Jack's research led to significant contributions to computer modeling of fatigue and cumulative damage. He identified critical energy-related engineering problems of national significance and developed several pioneering theoretical studies of earthquake response for the world's largest fossil fuel power plant. The work was supported by a multi-million-dollar grant from NSF and the Tennessee Valley Authority. Jack was the principal investigator (PI), with Hsu Lo as co-PI, on the first phase of the project; he was PI, with Henry Yang as co-PI, on the second phase. He also introduced the use of stochastic methods of analysis for solving large-scale, complex engineering problems. As was stated

in Purdue's memorial resolution, "Professor Bogdanoff was a structural dynamicist ahead of his time." Among his key contributions was "Theoretical Study of Seismic Response of the Paradise Cooling Tower," one in a series of papers on the topic, presented to the 6<sup>th</sup> World Conference on Earthquake Engineering held in New Delhi during the 1970s. The papers were focused on the steam-generator support structures, natural-draught cooling towers, tall chimneys, and coal-conveying structures of the fossil fuel plant at Paradise, Kentucky, the site of the major Tennessee Valley Authority power plant. A major goal of the study was to identify vulnerable aspects of the power plant to inform future designs. Professor Bogdanoff's research team included five professors, Hsu Lo, Henry T.Y. Yang, Anshel J. Schiff, C.T. Sun, and Kenneth Kayser, and several graduate students. The work resulted in six Ph.D. theses and many publications.

After his retirement from Purdue in 1986, Jack remained an internationally recognized authority on dynamics and applied stochastics. His pioneering research is a critical platform for continuing studies in structural dynamics that have far-reaching impacts. Some of his closest long-term friends and colleagues included NAE members Paul Chenea and Robert Naka and prominent Purdue colleagues George Hawkins, Hsu Lo, Paul Lykoudis, Edward Trabant, Frank Kozin, Shien-Shiu Shu, Jack Goldberg, Joe Modrey, and Al Orden from the University of Chicago. Jack's friendship with both Al Orden and Joe Modrey began at Wright Aeronautical during World War II.

Jack was a fellow of the American Association for the Advancement of Science and the American Society of Mechanical Engineers (ASME), and he was elected to the National Academy of Engineering in 1975 for "leadership in the introduction of stochastic processes into mechanical and civil engineering analysis." He was a committee chair for ASME and associate editor of the *Journal of Applied Mechanics*, co-editor of the *Proceedings of the First Symposium on Engineering Applications of Random Function Theory and Probability*, with Frank Kozin, and author of more than 75 papers published in such prestigious journals as the *International Journal of Mechanical Science*, *Journal of Terramechanics*, *Journal of the Acoustical Society of America*, *Journal of Applied Mechanics*,

*Journal of Sound and Vibration, Journal of the Engineering Mechanics Division of ASCE, and the American Institute of Chemical Engineers Journal.*

Jack was also an industry consultant for many corporations, including Chatham Electronics Corporation, Allison Division of General Motors, Baker Manufacturing Company, Aeroproducts Operations, Houdaille-Hershey Corporation, Graver Tank and Manufacturing Corporation, KSMB Systems, Inc., and Kozin-Bogdanoff and Associates, Inc.

Professor Bogdanoff was an inspiration to his students and colleagues. Known as a strict teacher who required the highest level of performance from his students, he was also an enthusiastic, generous mentor who contributed original and innovative ideas that inspired both colleagues and students. An early riser, Jack bicycled three miles to work before 7 a.m. every morning. One of his hobbies was woodworking, another area in which he was highly skilled.

He will be dearly remembered by generations of engineers. His Ph.D. students who have gone on to stellar careers in academia and industry include Tsu-Teh Soong (1962), Samuel P. Capen Professor of Engineering Science at SUNY Buffalo; Arnold L. Sweet (1964), professor of industrial engineering at Purdue University; Michael C. Bernard (1965), Professor Emeritus, Georgia Institute of Technology; Anshel J. Schiff (1967), consulting professor (retired), Stanford University; Siong Siu Luo (1970), chairman and CEO, Gate Trade, San Francisco; James V. Carnahan (1973), adjunct professor, UIUC; Kenneth Kayser (1973), CTO, BIAS Power Technologies, Roanoke, Virginia; William Kreiger (1977), Chevron Corporation, San Ramon, California; and Bong Kim (1982), vice president, Hyundai Electronics, South Korea.

Jack was predeceased by Ruth, his beloved wife of 45 years. He is survived by his son, Paul Bogdanoff, his daughter, Sue Cole, and granddaughter Aleksa Bogdanoff.

