Browder, Coifman, and Kadanoff Receive 2000 National Medals of Science

In January 2000 President Clinton announced the names of twelve individuals to receive the National Medal of Science, the nation's highest scientific honor. Among these were three who work in the mathematical sciences: FELIX E. BROWDER, RONALD R. COIFMAN, and LEO P. KADANOFF.

Felix E. Browder

Felix E. Browder was honored for "pioneering mathematical work in the creation of nonlinear functional analysis that opened up new avenues in nonlinear problems, and for leadership in the scientific community that broadened the range of interactions among disciplines." Browder, University Professor of Mathematics at Rutgers University, is president of the AMS.

Browder's work in nonlinear functional analysis and its applications to nonlinear partial differential equations have had a long-term impact on mathematics. One of his major early achievements was to advance the study of elliptic partial differential equations to treat nonlinear problems that had previously been out of reach. The thrust of his theory was a liberation from the requirements of compactness and convexity, thus opening up a wide range of problems of nonlinear partial differential equations to precise analysis. His seminal work on nonlinear equations of evolution has had a profound influence on the subject.

Browder's progressive international view of science made him a leader for his time. It was through his efforts that the French analysts developed the strong interactions with their American counterparts that characterizes present-day research efforts. His supportive efforts to improve undergraduate and graduate education in the mathematical sciences included bringing about the successful AMOCO project at the University of Chicago, a program to engage inner-city youth in science; as well as the Center for Mathematics, Science and Computer Education; and the Outreach Program in Mathematics at Rutgers University. He has sustained over many years, advocacy of the involvement of women and minorities in science and mathematics.

At a time when it was not popular within mathematical circles, Browder advocated including applied mathematics at the highest levels into mathematics departments and did so successfully at Rutgers and at the University of Chicago, where he is the Max Mason Distinguished Service Award Professor Emeritus.

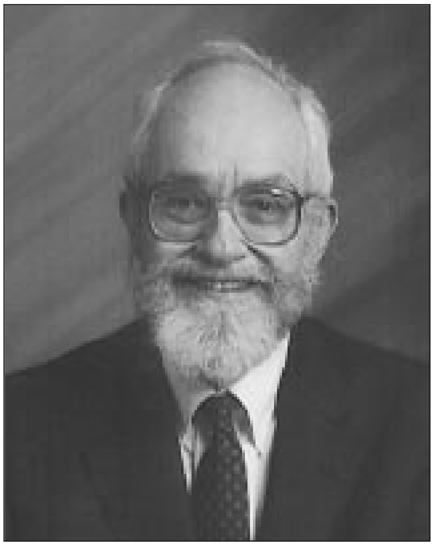
Ronald R. Coifman

Ronald R. Coifman was honored "for fundamental contributions to the field of harmonic analysis and for adapting that field to the capabilities of the digital computer to produce a family of fast, robust computational tools that have substantially benefited science and technology." He is the Phillips Professor of Mathematics at Yale University.

Coifman is a world leader in harmonic analysis. He introduced tools powerful enough to solve key problems in pure mathematics, yet sufficiently simple and flexible to become the basis for new, fast algorithms to handle the problems of wave propagation, data storage, de-noising, and medical imaging. As Coifman moved to applied mathematics, his work in the development of wavelet analysis had a revolutionary impact.

In collaboration with Yves Meyer, Coifman constructed a huge library of waveforms of various duration, oscillation, and other behavior. Through a clever algorithm developed with Victor Wickerhauser, it became possible to do very rapidly computerized searches through an enormous range of signal representations in order to quickly find the most economical transcription of measured data. This development allowed, for example, the FBI to compress a fingerprint database of 200 terabytes into less than 20 terabytes, saving millions of dollars in transmission time and storage costs.

Coifman also used wavelet analysis to develop tools for processing noisy data. He recognized



Felix E. Browder

Ronald R. Coifman

Leo P. Kadanoff

that one can essentially remove noise completely, allowing for short time exposure magnetic resonance images that would enable real-time "movies" inside the human body.

Coifman has continued to work on many computational problems in numerical analysis. The Beylkin-Coifman-Rokhlin matrix multiplication algorithm makes it possible to solve certain problems in high-intensity computations that were beyond the capability of any computer one might envision using previous algorithms.

Coifman's intellectual leadership has attracted first-class scientific talent from around the world to come to the United States to work on problems of national importance in signal processing and scientific computing.

Leo P. Kadanoff

Leo P. Kadanoff was honored "for leadership in fundamental theoretical research in statistical, solid state, and nonlinear physics which has led to numerous and important applications in engineering, urban planning, computer science, hydrodynamics, biology, applied mathematics, and geophysics." Kadanoff is the John D. MacArthur Distinguished Service Professor at the James Franck Institute of the University of Chicago.

Kadanoff has been a force in theoretical physics for nearly forty years. His concepts of scaling and universality have been used widely, both in research and in teaching. His textbook with Gordon Baym, *Quantum Statistical Mechanics*, is considered a classic and has been translated into many languages.

In his most important study, Kadanoff showed that sudden changes in material properties (for example, the magnetization of a magnet or the boiling of a fluid) could be understood in terms of scaling and universality. With his collaborators he showed how all the experimental data then available for the changes, called second-order phase transitions, could be understood in terms of these two ideas. These same ideas have now been extended to apply to a broad range of scientific and engineering problems and have found numerous and important applications in a wide range of areas.

Kadanoff has played a major role in the education of students. At the University of Chicago he was awarded the Quantrell Award for excellence in undergraduate teaching. He has been instrumental in introducing computers into physics laboratories as well as in developing associated instructional material. He has influenced the University of Chicago's entire academic approach by his strongly interdisciplinary techniques that blend experiment, theory, and computation. He creates opportunities for significant participation by students, postdoctoral associates, and young colleagues in a very broad range of research topics.

About the National Medal of Science

Established by Congress in 1959, the National Medal of Science is bestowed annually by the President of the United States on a select group of individuals deserving of special recognition by reason of their outstanding contributions to knowledge in the physical, biological, mathematical, engineering, social, or behavioral sciences. In 1962 President John F. Kennedy awarded the first Medal of Science to the late Theodore Von Karman, professor emeritus of the California Institute of Technology. The National Science Foundation administers the National Medal of Science program for the President. A distinguished, independent, twelve-member, presidential-appointed committee reviews the nominations and sends its list of recommendations to the President for final selection.

—Compiled from NSF news releases