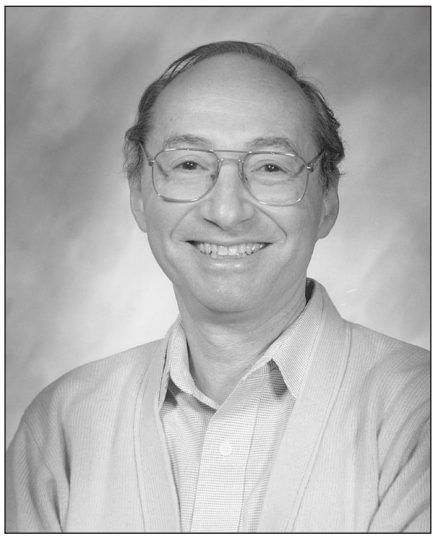
1998 Birkhoff Prize



Paul H. Rabinowitz

The 1998 George David Birkhoff Prize was awarded at the 104th Annual Meeting of the AMS in Baltimore in January. Awarded every five years to an individual selected by a joint committee of the AMS and the Society for Industrial and Applied Mathematics (SIAM), the prize recognizes outstanding contributions to applied mathematics in the highest and broadest sense. The Birkhoff Prize Fund was originally created in 1967 by the family of George David Birkhoff. The award of $4,000 is currently augmented by monies from the AMS Leroy P. Steele Fund.

The recipient of the 1998 Birkhoff Prize is PAUL H. RABINOWITZ. The prize is awarded by the Councils of the AMS and SIAM on recommendation of the AMS-SIAM selection committee whose members at the time of these selections were: Ivo M. Babuška, Jürgen Moser, and Srinivasa Varadhan.

The text that follows contains the committee's citation, a brief biographical sketch, and the response of Professor Rabinowitz upon receiving the prize.

Citation

Perhaps more than anyone else, Paul Rabinowitz has deeply influenced the field of nonlinear analysis. His methods for the analysis of nonlinear systems has changed the way we think of them.

His global bifurcation theorem is astonishing for its many applications. He discovered that under certain circumstances a local linearized analysis forces the existence of a global bifurcation. This is a very powerful result that is quoted very often.

In 1977 Paul Rabinowitz was the first person to prove the existence of periodic solutions of Hamiltonian systems on a star-shape energy surface. The existence of periodic orbits, a problem close to the interests of G. D. Birkhoff, is of course of fundamental importance to mechanics. This was the beginning of a remarkable development that is still going on. Rabinowitz introduced indefinite variational principles, which was a major achievement.

The traditional methods are limited to extrema or at best to problems involving functionals that are bounded on one side and satisfy the Palais-Smale compactness condition. Paul Rabinowitz broke new ground to invent general mini-max methods for problems not necessarily satisfying the Palais-Smale condition and that are indefinite. He was able to treat Hamiltonian systems, semilinear elliptic equations, and nonlinear wave equations. The famous mountain pass theorem, proved jointly with Antonio Ambrosetti, is one of the deep and beautiful results in the area. Rabinowitz has also introduced the use of sophisticated topological tools to obtain multiple solutions to nonlinear problems.

Rabinowitz is a powerful mathematician who combines abstract mathematics with concrete applications to problems arising in various fields.

Biographical Sketch

Paul H. Rabinowitz was born in Newark, New Jersey, on November 15, 1939. He carried out both

his undergraduate and graduate studies at New York University, receiving a B.A. in 1961 and a Ph.D. in 1966. He joined the faculty of Stanford University in January of 1966, serving first as instructor and then as assistant professor. In 1969 he became an associate professor at the University of Wisconsin-Madison and was promoted to professor in 1971. He was named the E. B. Van Vleck Professor of Mathematics in 1986. He has been a visiting professor at the Universities of Aarhus, Pisa, and Paris (1972–73) and at the ETH in Zurich (1982 and 1994).

Professor Rabinowitz has served on several AMS committees and is on the editorial board of several journals. He was a member of the Board of Trustees of the Mathematical Sciences Research Institute (1987–93).

Professor Rabinowitz was a Guggenheim Fellow in 1978–79. In 1984 he delivered the Colloquium Lectures and also was the principal speaker in a Regional Conference sponsored by the CBMS (Conference Board of the Mathematical Sciences). He was elected to the American Academy of Arts and Sciences in 1987 and received an honorary degree from the University of Paris in 1992.

Professor Rabinowitz's research interests include the calculus of variations, partial differential equations, and dynamical systems.

Response

It is an honor and a pleasure to be awarded the Birkhoff Prize by the AMS and SIAM for my work in nonlinear analysis. I greatly appreciate the generous citation of my achievements. I have always found the interface between analysis and applications to be a fruitful area. In addition, the interaction between problems and methods has always been central to my work: the solutions of concrete problems lead to general methods which in turn lead to progress on broader classes of problems.

I am grateful to my teachers at the Courant Institute, my colleagues in Madison, my collaborators, and my friends, from all of whom I have learned so much.