2009 AMS-SIAM Birkhoff Prize

JOEL SMOLLER received the 2009 AMS-SIAM George David Birkhoff Prize in Applied Mathematics at the Joint Mathematics Meetings in Washington, DC, in January 2009.

Citation

The 2009 George David Birkhoff Prize in Applied Mathematics is awarded to Joel Smoller for his leadership, originality, depth, and breadth of work in dynamical systems, differential equations, mathematical biology, shock wave theory, and general relativity. His classic text on shock waves has had far-reaching impact on the field. His work with Charles Conley led to many results on reaction-diffusion equations, with diverse applications to biology, physiology, and chemistry. His work with Arthur Wasserman on bifurcation theory, which introduced an equivariant version of the Conley index, was a tour de force of original methods, providing a rigorous analysis and characterization of radial stationary solutions of the Einstein Yang-Mills equations. He and Blake Temple developed a theory of shock wave propagation in general relativity and gave the first exact solution of the Einstein equations. Overall, his powerful intuition for innovative new directions and his forcefulness in cementing powerful collaborations have been emblematic of a career worthy of emulation.

Joel Smoller

Biographical Sketch

Joel Smoller was born in New York City and was an undergraduate at Brooklyn College. He obtained his Ph.D. at Purdue University in 1963, writing a thesis in abstract functional analysis. He has spent his entire academic career at the University of Michigan and was promoted to full professor in 1969. Shortly after arriving at Michigan, his research interests changed to partial differential equations. He has supervised 27 Ph.D. students, including Tai-Ping Liu (Stanford), David Hoff (Indiana), Robert Gardner (University of Massachusetts), Blake Temple (University of California, Davis), and Zhouping Xin (Chinese University of Hong Kong). Smoller has held the Lamberto Cesari Chair of Mathematics at the University of Michigan since 1998. His awards include a senior Humboldt Fellowship, 2005–2008; Morningside Lecturer, International Congress of Chinese Mathematicians, 2001 and 2004; Rothschild Professor and Rothschild Lecture, University of Cambridge (UK), 2003; Patton Lecturer, Indiana University, 2001; Distinguished Alumnus Award, Purdue University, 2000; Excellence in Research Award, University of Michigan, 1996; Plenary Address, Marcel Grossman Conference in Physics (Stanford University), 1994; joint Harvard-MIT-Brandeis lecture, 1994; Margaret and Herman Sokol Award, University of Michigan, 1992; Ordway Lecturer, University of Minnesota, 1985; Guggenheim Fellowship, 1980–1981. Three issues of the journal *Methods and Applications of Analysis* **12**, nos. 2, 3, 4, displaying his picture on the covers, were dedicated to him in 2005. Smoller has been the editor for five journals (*Michigan Mathematics Journal, Applicable Analysis, Journal of Hyperbolic Differential Equations, Nonlinearity*), and he was the PDE editor for the *Transactions of the American Mathematical Society*, 1982–1986. National meetings were dedicated to his 60th and 70th birthdays at UC Davis and Stanford University, respectively.

Response

It is a great honor to be chosen as the recipient of the 2009 George David Birkhoff Prize in Applied Mathematics. I am appreciative of the American Mathematical Society and to the Society for Industrial and Applied Mathematics for their recognition of my research accomplishments. Above all, I would like to thank my many collaborators

for their generosity, their encouragement, and for patiently introducing me to a wealth of new ideas. Special thanks are due to Blake Temple, who has been a longtime collaborator and has shared many of his beautiful new ideas with me.

Many outstanding mathematicians have influenced me and affected the trajectory of my research career. In particular, I owe many thanks to Edward Conway, who taught me the mathematics of shock waves, and to Charles Conley, who was my friend, mentor, and collaborator for many years. Both Conway and Conley passed away unexpectedly more than twenty years ago, but I still miss them. James Glimm, Peter Lax, and Shing-Tung Yau have always supported and encouraged me, and for this I owe them many thanks. My younger collaborator Felix Finster, has greatly influenced my work by taking me into new and exciting directions. Finally, my many excellent students, including Blake Temple, David Hoff, Tai-Ping Liu, Zhouping Xin, and Robert Gardner, have had an impact on my career by being both my teachers and collaborators.

I have always been attracted to special problems whose analysis uncovers new phenomena in physical settings. I have tended to start in new directions, rather than work on more technical problems that finish up fields. Like most, I learn best through collaboration, and I have been extremely lucky to find brilliant colleagues who have led me into so many rewarding experiences.

About the Prize

The Birkhoff Prize recognizes outstanding contributions to applied mathematics in the highest and broadest sense and is awarded every three years (until 2001, it was awarded usually every five years). Established in 1967, the prize was endowed by the family of George David Birkhoff (1884–1944), who served as AMS president during 1925–1926. The prize is given jointly by the AMS and the Society for Industrial and Applied Mathematics (SIAM). The recipient must be a member of one of these societies and a resident of the United States, Canada, or Mexico. The prize carries a cash award of US$5,000.

The recipient of the Birkhoff Prize is chosen by a joint AMS-SIAM selection committee. For the 2009 prize, the members of the selection committee were: Peter W. Jones (chair), George C. Papanicolaou, and Terence C. Tao.

Previous recipients of the Birkhoff Prize are Jürgen K. Moser (1968), Fritz John (1973), James B. Serrin (1973), Garrett Birkhoff (1978), Mark Kac (1978), Clifford A. Truesdell (1978), Paul R. Garabedian (1983), Elliott H. Lieb (1988), Ivo Babuška (1994), S. R. S. Varadhan (1994), Paul H. Rabinowitz (1998), John N. Mather (2003), Charles S. Peskin (2003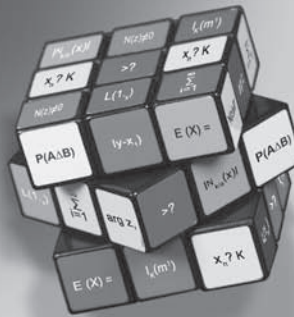), and Cathleen S. Morawetz (2006).