2006 Steele Prizes

The 2006 Leroy P. Steele Prizes were awarded at the 112th Annual Meeting of the AMS in San Antonio in January 2006.

The Steele Prizes were established in 1970 in honor of George David Birkhoff, William Fogg Osgood, and William Caspar Graustein. Osgood was president of the AMS during 1905–1906, and Birkhoff served in that capacity during 1925–1926. The prizes are endowed under the terms of a bequest from Leroy P. Steele. Up to three prizes are awarded each year in the following categories: (1) Lifetime Achievement: for the cumulative influence of the total mathematical work of the recipient, high level of research over a period of time, particular influence on the development of a field, and influence on mathematics through Ph.D. students; (2) Mathematical Exposition: for a book or substantial survey or expository-research paper; (3) Seminal Contribution to Research: for a paper, whether recent or not, that has proved to be of fundamental or lasting importance in its field, or a model of important research. Each Steele Prize carries a cash award of US$5,000.

The Steele Prizes are awarded by the AMS Council acting on the recommendation of a selection committee. For the 2006 prizes, the members of the selection committee were: Rodrigo Banuelos, Daniel S. Freed, John B. Garnett, Victor W. Guillemin, Craig L. Huneke, Tsit-Yuen Lam (chair), Robert D. MacPherson, Linda P. Rothschild, and David A. Vogan.

The list of previous recipients of the Steele Prizes may be found in the November 2005 issue of the *Notices*, pages 1251–1255, or on the World Wide Web, `http://www.ams.org/prizes-awards`.

The 2006 Steele Prizes were awarded to Lars V. Hörmander for Mathematical Exposition; to Clifford S. Gardner, John M. Greene, Martin D. Kruskal, and Robert M. Miura for a Seminal Contribution to Research (this year restricted to the field of applied mathematics); and to Frederick W. Gehring and Dennis P. Sullivan for Lifetime Achievement. The text that follows presents, for each awardee, the selection committee's citation, a brief biographical sketch, and the awardee's response upon receiving the prize.

Mathematical Exposition: Lars V. Hörmander

Citation

The four volumes of Lars Hörmander's *The Analysis of Linear Partial Differential Operators* are a compendium of practically all of the exciting developments that occurred in the theory of linear partial differential equations and in the area of microlocal analysis in the period 1960–1985.

Microlocal analysis emerged as a well-defined part of modern analysis with the development of pseudodifferential operators in the early 1960s. This made possible a "microlocal" way of thinking about the basic objects in linear partial differential equation theory: the fundamental solutions of these equations and the classes of generalized functions to which the solutions of these equations belong. Thanks to microlocal techniques, one could analyze the singularities of these functions much more precisely, and implement much more explicitly than before, for many different varieties of differential equations, the "semi-classical limit" of quantum mechanics.

In these four volumes, Hörmander describes these developments in a treatment that is seamless and self-contained. Moreover, the effort to make this treatment self-contained has inspired him to recast, in much more simple and accessible form, the approach to much of this material as it originally appeared in the literature. An example is the theory of Fourier integral operators, which was invented by him in two seminal papers in the early

1970s. (These get a completely new and much more elegant reworking in volume four.) In brief, these four volumes are far more than a compendium of random results. They are a profound and masterful "rethinking" of the whole subject of microlocal analysis.

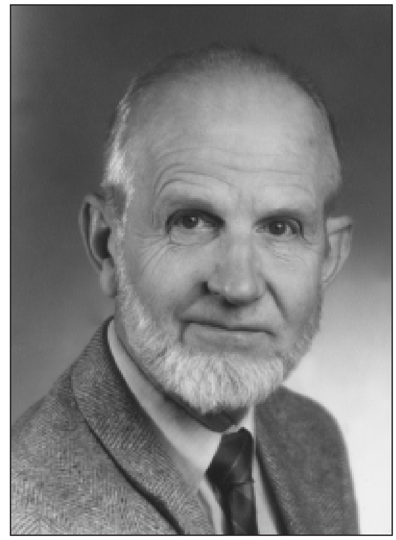
Hörmander's four volumes on partial differential operators have influenced a whole generation of mathematicians working in the broad area of microlocal analysis and its applications. In the history of mathematics one is hard-pressed to find any comparable "expository" work that covers so much material, and with such depth and understanding, of such a broad area of mathematics.

Another of Hörmander's masterpieces in exposition is his much shorter book, *Complex Analysis in Several Variables*, the first edition of which appeared in 1973. Like the four volumes cited above, it is remarkable in the scope of what it covers. For instance the first chapter, only 22 pages long, is one of the best treatments of functions of one complex variable available anywhere in the literature. Now, more than 30 years later, this excellent book remains the gold standard in teaching a graduate course in several complex variables at many universities in the U.S. and abroad. This short text of about 200 pages is a "must read" for anyone who works or uses the modern theory of analysis of several complex variables. In particular, it contains the best treatment available for weighted L^2 estimates for d-bar equations (originally invented by Hörmander), which continue to be used in other areas of mathematics.

In conclusion, Lars Hörmander's contribution to mathematical exposition is highly unusual and perhaps even unique in modern times.

Biographical Sketch

Lars Hörmander was born on January 24, 1931, in southern Sweden. He was an undergraduate and a graduate student at the University of Lund, Sweden, first with Marcel Riesz and then, after Riesz retired, with Lars Gårding as advisor. After obtaining a Ph.D. in 1955 he spent a year in the U.S.—two quarters at the University of Chicago and a semester at what is now the Courant Institute at New York University—before returning as full professor to the University of Stockholm in 1957. During the academic year 1960–1961 he was a member of the Institute for Advanced Study (IAS) in Princeton and a visitor at Stanford University in the summers of 1960 and 1961, where he had a permanent appointment in 1963–1964 before leaving both Stockholm and Stanford to become a professor and permanent member at the IAS. He left Princeton in 1968 to return to Sweden as professor in Lund, where he remained until retiring in 1996, apart from about two more years in the U.S., mainly at IAS, Stanford, the Courant Institute, and the University of California, San Diego.



Lars V. Hörmander

Response

I am very happy and grateful to receive this award for the activity which has dominated a great part of my professional life, and I wish to thank the members of the Selection Committee for their consideration.

My expository writing started in the 1950s with modest lecture notes just intended for the students in Stockholm I wanted to introduce to the theory of partial differential equations. I toyed with the idea of expanding them to a book but this seemed unrealistic until in 1960 I received a letter from one of the editors of the famous Springer "yellow series" inviting me to write a book for it. This was an enormous encouragement, and as a result I devoted a great deal of the academic year 1960–1961 to this project, including research on topics which had to be better understood to make a systematic exposition possible. The manuscript of my first book *Linear Partial Differential Operators* was finished in 1962, and it appeared in 1963 in the yellow series. I was then working to understand better the applications of the theory of functions of several complex variables to the theory of partial differential equations with constant coefficients which I had not been able to cover in my book, and with the so-called $\overline{\partial}$-Neumann problem which through work of Morrey, Kohn, and others had just made it possible to conversely base the theory of functions of several complex variables on the theory of partial differential equations. When I lectured on these topics at Stanford in 1964 I wrote detailed lecture notes. After some additions to round them off they were published by van Nostrand in 1966 as *An Introduction to Complex Analysis in Several Variables*, which is one of the books mentioned in the citation. Expanded editions were published by North Holland in 1973 and 1990.

The rapid development of microlocal analysis in the 1960s quickly made the book in the yellow series obsolete, but the pace was so fast that it seemed impossible to make it up to date. However, fifteen years after it had been published I thought that it was worth trying, and after the year 1977–1978 at IAS and Stanford devoted to preparations, I could make preliminary plans for a replacement in three volumes, again encouraged by Springer Verlag. When the manuscript was finished in 1984 the third volume had grown so much that it had to be divided in two, the last appeared in 1985. The title *The Analysis of Linear Partial Differential Operators* was chosen to indicate that the four volumes had developed from the 1963 book, which is why

I have mentioned it here although it is not included in the citation. After two decades they are of course no longer up to date but they can still serve as an introduction to many of the basic techniques in the field. The first two volumes have been preserved in the Springer Classics in Mathematics series, and the last two should soon join them there.

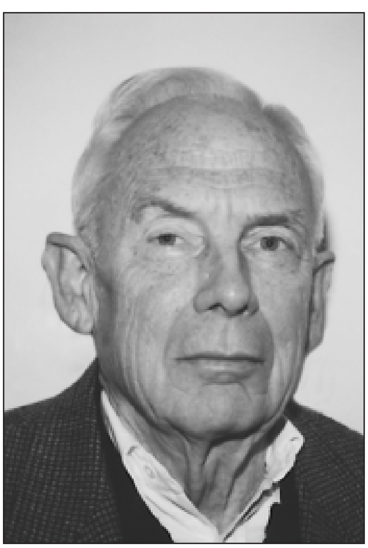
In conclusion I would like to thank the many colleagues and students whose encouraging interest has stimulated my expository writing. Without such support and constructive criticism it would have been hard to persevere with that for so many years.

Seminal Contribution to Research: Clifford S. Gardner, John M. Greene, Martin D. Kruskal, and Robert M. Miura

Citation

The prize is awarded for their joint paper "Korteweg-deVries equation and generalizations. VI. Methods for exact solution", *Comm. Pure Appl. Math.* **27** (1974), 97–133.

This is a fundamental paper in the theory of solitons, inverse scattering transforms, and nonlinear completely integrable systems. Before it, there was no general theory for the exact solution of any important class of nonlinear differential equations. Except for a few special cases, only approximations to solutions were possible. This paper, in the context of the Korteweg-deVries equation, introduced the use of scattering parameters of an associated linear problem to solve a nonlinear equation—effectively generalizing Fourier series and Fourier transforms to nonlinear equations. The idea was quickly extended to other nonlinear evolution equations, triggering important work in dynamical systems, inverse scattering, and symplectic geometry, to name a few. In applications of mathematics, solitons and their descendants (kinks, anti-kinks, instantons, and breathers) have entered and changed such diverse fields as nonlinear optics, plasma physics, and ocean, atmospheric, and planetary sciences. Nonlinearity has undergone a revolution: from a nuisance to be eliminated, to a new tool to be exploited.



Clifford S. Gardner

Biographical Sketch: Clifford S. Gardner

Clifford S. Gardner was born in Fort Smith, Arkansas, in 1924. He graduated from Phillips Academy in 1940 and received his A.B. from Harvard College in 1944 and his Ph.D. from New York University in 1952. He worked in applied mathematics at various places including NASA Langley Field, Livermore National Laboratory, the Courant Institute, and the Princeton Plasma Physics Laboratory. He was professor of mathematics at the University of Texas, Austin, from 1967 until his retirement in 1990.

Biographical Sketch: John M. Greene

John M. Greene received his B.S. degree in physics from the California Institute of Technology in 1950 and his Ph.D. in theoretical particle physics from the University of Rochester in 1956. He worked at the Princeton Plasma Physics Laboratory (1956–1982) and at General Atomics from 1982 until his retirement in 1995. He has been a Fellow of the American Physical Society and a member of the American Geophysical Union.

In 1992 Greene was awarded the James Clerk Maxwell Prize from the Division of Plasma Physics of the American Physical Society. The citation reads: "For outstanding contributions to the theory of magnetohydrodynamic equilibria and ideal and resistive instabilities, for discovery of the inverse scattering transform leading to soliton solutions of many nonlinear partial differential equations, and for the invention of the residue method of determining the transition to global chaos."

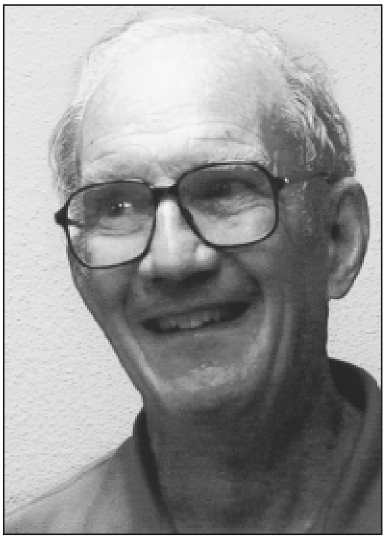
Response: John M. Greene

[This response is written by Alice Greene on behalf of John Greene.] John was always pleased with the work on the Korteweg-de Vries equations. I recall his triumphal announcement, "It unfolded like a lily!" (After much intense work, I imagine.) He would be truly delighted with its recognition by the American Mathematical Society.

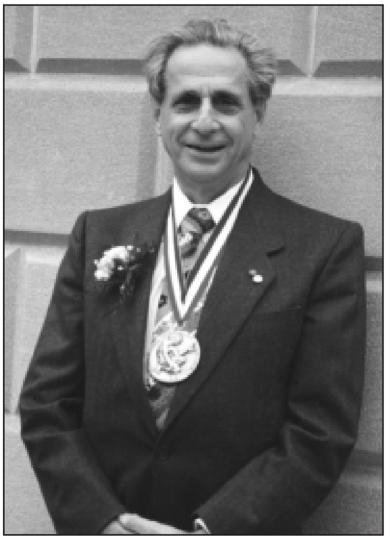
Biographical Sketch: Martin D. Kruskal

Martin D. Kruskal was born in New York City on September 28, 1925. He earned his B.S. from the University of Chicago in 1945 and his M.S. and Ph.D. from New York University in 1948 and 1952, respectively. He began his career as an instructor in the mathematics department at New York University (1946–1951) and then moved to Princeton University as a Research Scientist in the Plasma Physics Laboratory (formerly Project Matterhorn), becoming Senior Research Associate in 1959. While at Princeton, he was a lecturer in astronomy (1959–1961), Director of the Program in Applied (and Computational) Mathematics (1968–1986), professor of astrophysical sciences (1961–1989), professor of mathematics (1979–1989), and is professor emeritus (1989–). He is currently David Hilbert Professor of Mathematics at Rutgers University.

Kruskal has given innumerable invited lectures at conferences and institutions and has served on many advisory committees and editorial boards. He has traveled widely and has held various visiting and fellowship positions at the Max Planck Institut für Physik und Astrophysik (Munich), the University of Grenoble (France), the Lebedev Institute (Moscow), the Weizmann Institute of Science (Israel), Nagoya



John M. Greene



Martin D. Kruskal

Robert M. Miura

University (Japan), Bharathidasan University (India), Australian National University, the University of New South Wales (Australia), the University of Adelaide (Australia), Los Alamos National Laboratory, the University of California at Santa Barbara, and the University of Chicago.

Kruskal has been the recipient of numerous honors and awards, including the National Medal of Science, the National Academy of Sciences Award in Applied Mathematics and Numerical Analysis, the von Neumann Prize of the Society for Industrial and Applied Mathematics, and the Potts Gold Medal of the Franklin Institute (Philadelphia). He has received an honorary doctorate from Heriot-Watt University. He is a member of the National Academy of Sciences and the American Academy of Arts and Sciences, a foreign member of the Royal Society of London and the Russian Academy of Natural Sciences, and an Honorary Fellow of the Royal Society of Edinburgh.

Response: Martin D. Kruskal

It is usual for a prize recipient to thank the relevant society, the AMS in the present case, and the committee members who made the selection, for being selected—and I do certainly wish to express those sentiments. However, I also wish warmly to thank my co-recipients, who played such a major role in our joint research, and from whom I learned so much in the process.

Among the several functions that such prizes serve, a seldom mentioned one is to validate the decisions and efforts that the awardees invested in over, often, years of self-doubt and threatening discouragement. Research success may indeed be its own reward, but it helps nevertheless to receive the recognition of one's peers.

So, thanks to all of you!

Biographical Sketch: Robert M. Miura

Robert M. Miura was born on September 12, 1938, in Selma, California. He received his B.S. and M.S. degrees in mechanical engineering from the University of California at Berkeley in 1960 and 1962, respectively, and his M.A. and Ph.D. in aerospace and mechanical sciences from Princeton University in 1964 and 1966, respectively. His doctoral research was in the area of the kinetic theory of gases. His first postdoctoral position in 1965–1967 was at the Princeton Plasma Physics Laboratory, part of Princeton University, where he started research on nonlinear wave propagation. There he worked closely with Martin Kruskal, Clifford Gardner, and John Greene on the Korteweg-de Vries equation, a nonlinear dispersive partial differential equation exhibiting soliton solutions and having numerous applications. This collaboration led to the inverse scattering method for exact solution of the KdV equation and also to the proof of an infinite number of conservation laws. His postdoctoral position at the Courant Institute in 1967–1968 was in the Magneto-Fluid Dynamics Division headed by Harold Grad.

Miura has taught at New York University (1968–1971), Vanderbilt University (1971–1975), and the University of British Columbia (1975–2001). In 1975, upon his arrival at the University of British Columbia, his research interests changed to mathematical neuroscience, specifically excitable cells, and mathematical physiology more generally. Since 2001, he has been Professor of Mathematical Sciences and of Biomedical Engineering at the New Jersey Institute of Technology. He is currently acting chair of the Department of Mathematical Sciences. He is a fellow of the John Simon Guggenheim Foundation (1980), the Royal Society of Canada (1995), and the American Association for the Advancement of Science (2005). He has authored many research papers and served on several editorial boards. Presently, he is co-editor-in-chief of *Analysis and Applications* and is on the editorial boards of the *Canadian Applied Mathematics*

Quarterly and *Integrative Neuroscience*. He is a member of the American Mathematical Society, the Society for Industrial and Applied Mathematics, the Society for Mathematical Biology, the Canadian Mathematical Society, and the American Association for the Advancement of Science.

Response: Robert M. Miura

I am particularly pleased, honored, and humbled to receive the 2006 Leroy P. Steele Prize along with my colleagues, Clifford Gardner, John Greene, and Martin Kruskal, and to be recognized for the work on the Korteweg-de Vries equation that we did forty years ago. As a fresh postdoc, I was very fortunate to have had the opportunity to work with and to have been mentored by three generous and smart guys. The two years at the Princeton Plasma Physics Laboratory were the happiest and most exciting years in my research career. Every day came with the time to think deeply about new ideas and to produce results. The soliton solutions of the KdV equation, discovered by Kruskal and Zabusky, showed this equation is special. The initial-value problem for the KdV equation is fascinating, and there are many special properties of the equations, e.g., an infinity of conservation laws resulting in infinitely many conserved integrals of the motion. A major breakthrough was the development of a method for exact solution of the initial-value problem for the KdV equation on the infinite line, which we called the "inverse scattering method" since it utilized the scattering problem for the time-independent Schrödinger equation. At the time, we thought this method was very special and only could be applied to this equation. However, the Russians Zakharov and Shabat showed how to generalize the method to systems of equations, and the rest is history.

Lifetime Achievement: Frederick W. Gehring

Citation

For over fifty years F. W. Gehring has been a leading figure in the theory of quasiconformal mappings. The cornerstone of the two-dimensional theory is his theorem that the geometric definition of quasiconformality (infinitesimal discs are mapped to infinitesimal ellipses with eccentricity bounded) implies the more restrictive analytic definition. Gehring created the higher dimensional theory of quasiconformal maps, which is very different from the two-dimensional case. His work on convergence theorems, Hölder exponents, and the L^p integrability of Jacobians forms the foundation of the higher dimensional theory.

Largely because of Gehring's work, the theory of quasiconformal mappings has influenced many other parts of mathematics, including complex dynamics, function theory, partial differential equations, and topology. Higher dimensional quasiconformality is an essential ingredient of the Mostow rigidity theorem and of recent work of Donaldson and Sullivan on gauge theory and four-manifolds, and quasiconformality has inspired much beautiful recent analysis on general metric spaces by Heinonen, Koskela, and others.

Gehring's mathematics is characterized by its elegance and simplicity and by its emphasis on deceptively elementary questions which later become surprisingly significant.

A person of incredible energy and enthusiasm, Fred Gehring has trained twenty-nine Ph.D. students, many of whom are now faculty members at research universities, and he has mentored more than forty postdoctoral fellows. The list of Gehring's former postdocs at Michigan represents a large fraction of the present day leaders in complex analysis.

Biographical Sketch

Frederick Gehring was born in Ann Arbor, Michigan, and his association with the University of Michigan goes back two generations to his grandfather, John Oren Reed, who was a member of the physics faculty and Dean of the College of Literature, Science and the Arts. Gehring joined the U.S. Navy in 1943 and subsequently earned two degrees from Michigan—bachelor of science in mathematics and electrical engineering in 1946, and master of science in mathematics in 1949. He returned to teach mathematics at Michigan in 1955 after completing his Ph.D. at Cambridge and spending three years as a Benjamin Peirce Instructor at Harvard. He became a professor in 1962, was named to a collegiate chair in 1984, and became the T. H. Hildebrandt Distinguished University Professor in 1987, one of the university's highest honors for faculty. His long and distinguished history of service at Michigan includes three terms as chair of the department of mathematics.

Gehring has received numerous awards, including the Distinguished Faculty Achievement Award, the Sokol Faculty Award, the Humbolt Award, and an Onsager Professorship. He was the Henry Russel Lecturer for 1990. In 1989 he was elected to the National Academy of Sciences. He has also received honorary degrees from the University of Helsinki, the University of Jyväskylä, and the Norwegian University of Science and Technology.

Gehring also has a long record of service to the AMS. He has been a member of the Executive Committee (1973–1975, 1980–1982), a Member at Large of the Council (1980–1982), and a member of the Board of Trustees (1983–1992; chair 1986, 1991). He has served on numerous committees, including the Committee on Science Policy (1981–1983, 1985–1987), the Committee on Governance (1993; chair), and the Editorial Committees for the *Bulletin, Mathematical Reviews, Proceedings*, and the *Electronic Journal on Conformal Geometry and Dynamics*.

Fulbright and Guggenheim Fellowships in 1958–1960 allowed Gehring to study in Helsinki and Zürich, where he began to learn the theory of quasiconformal mappings, a subject that became the focus of his life's work. He was instrumental in developing the theory, often in collaboration with Finnish colleagues, in bringing it into the mainstream of mathematical analysis, and in making contact with potential theory, partial differential equations, geometric topology, Riemannian geometry, and complex dynamics, as well as classical function theory. In particular, he pioneered the important extension of the theory to *n*-dimensional space, emphasizing new tools such as extremal length, and has brought quasiconformal mappings into a broad study of discrete transformation groups. He has generously shared his passion for mathematics and research by mentoring over seventy Ph.D. students and postdoctoral fellows during his career.

Response

Some of the earliest memories I had as a child were music which my father played on a piano and orchestral pieces which he played on a large victrola. I was fascinated by what I heard and subsequently spent several years learning how to play the piano.

Later as I was finishing high school in 1943 I learned how to build radios and looked forward to a career in physics. But world events intervened. I joined the U.S. Navy V-12 program in June 1943 and spent the next thirty-two months as a student in the Department of Electrical Engineering at the University of Michigan.

This was a fascinating but somewhat frustrating experience since I would have preferred to see more rigorous proofs for the things I had learned. Hence after the war I changed my major and studied mathematics at Michigan and then at Cambridge University in England.

I never regretted that decision, and I consider the ensuing years of teaching and research as the happiest possible. The opportunity to guide my Ph.D. students and the postdoctoral fellows with whom I have worked was educational, rewarding, and fulfilling.

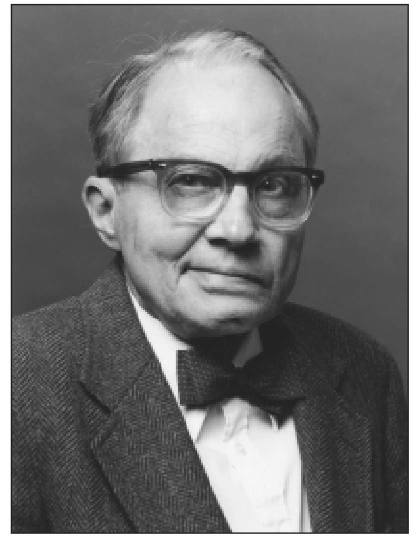
Indeed I would feel quite remiss in accepting this award without acknowledging how much I owe to them. So now I thank you for this award which I accept in their names also.

Lifetime Achievement: Dennis P. Sullivan

Citation

Dennis Sullivan has made fundamental contributions to many branches of mathematics. Sullivan's theory of localization and Galois symmetry, propagated in his famous 1970 MIT [Massachusetts Institute of Technology] notes, has been at the heart of many subsequent developments in homotopy theory. Sullivan used it to solve the Adams Conjecture and the Hauptvermutung for combinatorial manifolds. Later Sullivan developed and applied rational homotopy theory to problems about closed geodesics, the automorphism group of a finite complex, the topology of Kähler manifolds, and the classification of smooth manifolds. He has reinvented himself several times, playing major or dominant roles in dynamical systems, Kleinian groups, and low dimensional topology.

These brief remarks do not do justice to the scope of Sullivan's ideas and influence. Beyond the specific theories he has developed and the problems he has solved—and there are many significant ones not mentioned here—his uniform vision of mathematics permeates his work and has inspired those around him. For many years he was at the center of the mathematical conversation at IHÉS [Institut des Hautes Études Scientifiques]. Later he moved to New York where his weekly seminar remains an important feature of mathematical life in the City.



Frederick W. Gehring

Dennis P. Sullivan

Biographical Sketch

Dennis Sullivan was born February 12, 1941, in Port Huron, Michigan, but he grew up in Houston, Texas. He graduated from Rice University in 1963 and went to Princeton University; his Ph.D. thesis (1966) on geometric topology was written under the direction of William Browder. After graduation he held a NATO Fellowship at Warwick, where he continued work in the general area of his thesis (Hauptvermutung for manifolds, 1967), and a Miller Fellowship at Berkeley (work on the Adams conjecture, K-theory, and étale homotopy). He spent 1969 to 1973 as a Sloan Fellow of Mathematics at the Massachusetts Institute of Technology, studying localization in homotopy theory (in particular, Galois symmetry), étale theory, and the construction of minimal models for the rational homotopy type of manifolds, using differential forms.

He shared the AMS Veblen Prize with Rob Kirby in 1971. In 1973–1974, Sullivan visited the University of Paris-Orsay. He remained in France as *professeur permanent* at the Institut des Hautes

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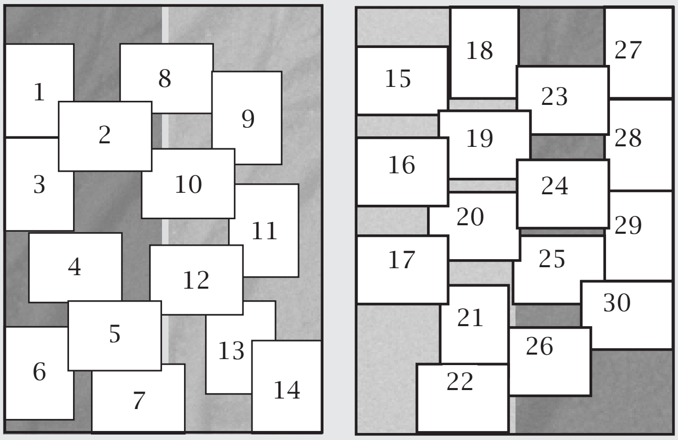

1. Welcome to the Joint Mathematics Meetings, San Antonio, TX, Henry B. Gonzalez Convention Center.
2. MAA Booth, Exhibits area.
3. Moving about the Convention Center.
4. Ribbon-cutting ceremony for the Exhibits area (left to right: James Tattersall (MAA), Martha Siegel (MAA), John Ewing (AMS), James Arthur (AMS), Carl Cowen (MAA), Robert Daverman (AMS), Tina Straley (MAA)).
5. Sharing ideas between sessions.
6. AMS Booth, Exhibits area.
7. Opening day of the Exhibits.
8. Birkhoff Prize winner Cathleen S. Morawetz.
9. Steele Prize winner Dennis P. Sullivan.
10. Steele Prize winner Clifford S. Gardner with AMS president James Arthur.
11. AMS Colloquium Lecturer Hendrik W. Lenstra Jr.
12. Audience in large lecture.
13. Who Wants To Be a Mathematician game contestant.
14. “Hands-on” at the Math in Art exhibit.
15. Interviewing in the Employment Center.
16. Math on the Web demonstration.
17. Left to right, AMS executive director John Ewing, AMS senior editor Ina Lindemann, former AMS president David Eisenbud.
18. Mathematical artwork.
19. New Orleans (site of 2007 JMM) information booth.
20. Interviewing in the Employment Center.
21. Steele Prize winner Frederick W. Gehring and Mrs. Gehring.
22. JMM registration booth.
23. Who Wants To Be a Mathematician contestants during the game.
24. Chess between sessions.
25. Networking area.
26. “Glass Geometry” booth.
27. Email center.
28. Dusa McDuff, AMS Invited Address speaker.
29. Message Board.
30. Who Wants To Be a Mathematician winners Susan Zhang and David Neville with host Mike Breen.

Études Scientifiques, full-time until 1981, when he was named Einstein Professor at the City University of New York, and half-time after that until 1996, when he joined the Mathematics Department and the Institute for Mathematical Sciences at SUNY, Stony Brook. During his years in France, his interests expanded first towards dynamical systems, including ergodic theory, foliations, Kleinian groups, and renormalization, and then, motivated originally by problems in conformal dynamics, towards Teichmüller theory (No Wandering Domains Theorem, 1982). He was awarded the Prix Élie Cartan by the Académie des Sciences de Paris in 1981, the King Faisal Prize in Science in 1994, the Ordem Scientifico Nacional by the Brazilian Academy of Sciences in 1998, and the United States National Medal of Science in 2005. He was elected to the United States National Academy of Sciences in 1983 and to the Brazilian National Academy of Sciences in 1984. He was awarded honorary degrees by the University of Warwick in 1983 and the École Normale Supérieure de Lyon in 2001. His most recent work centers on quasiconformal analysis, holomorphic dynamics, and the relation between algebraic topology, quantum theory, and fluid dynamics. Dennis Sullivan has three daughters, three sons, and two grandchildren.

Response

I am very honored and pleased to receive the Steele Prize—with a small nuance that it is awarded for work done up to now. I am still trying to understand the correct algebraic structure of an algebraic model for manifold or spacetime. My thesis advisor’s original emphasis on Poincaré duality is still the guide, but now expressed in new algebraic data related to the physicist’s correlations, or multilinear functions on a space of states. I hope to apply this to write down finite dimensional computationally effective algorithms in nonlinear problems like fluid dynamics with applications to problems like helping out the 48 hour more precise advance prediction of the landfall of hurricanes like Katrina and Rita.