Mathematics People

Baouendi and Rothschild Receive 2003 Bergman Prize

M. Salah Baouendi and Linda Preiss Rothschild have been awarded the 2003 Stefan Bergman Prize. Established in 1988, the prize recognizes mathematical accomplishments in the areas of research in which Stefan Bergman worked. For one year each awardee will receive half of the income from the prize fund. Currently this income is about $22,000 per year.

The previous Bergman Prize winners are: David W. Catlin (1989), Steven R. Bell and Ewa Ligocka (1991), Charles Fefferman (1992), Yum Tong Siu (1993), John Erik Fornæss (1994), Harold P. Boas and Emil J. Straube (1995), David E. Barrett and Michael Christ (1997), John P. D'Angelo (1999), Masatake Kuranishi (2000), and László Lempert and Sidney Webster (2001). On the selection committee for the 2003 prize were John Erik Fornæss, J. J. Kohn (chair), and Yum Tong Siu.

Citation

The Bergman Prize was awarded to Professors Salah Baouendi and Linda Rothschild for their joint and individual work in complex analysis. In addition to many important contributions to complex analysis they have also done first rate work in the theory of partial differential equations. Their recent work is centered on the study of CR manifolds to which they and their collaborators have made fundamental contributions.

The Cauchy-Riemann equations on a complex manifold define holomorphic functions. A real submanifold in a complex manifold inherits the Cauchy-Riemann equations along its complex tangential directions. A CR manifold (abbreviation for Cauchy-Riemann manifold) is a manifold which is endowed with tangential Cauchy-Riemann equations modeled on a real submanifold in a complex manifold. A function on a CR manifold which satisfies the tangential Cauchy-Riemann equations is a CR function. A map between CR manifolds which satisfies the tangential Cauchy-Riemann equations is a CR map.

The work of Baouendi and Rothschild on CR manifolds focuses on two aspects. One aspect concerns CR maps. When can a locally defined CR map be extended to a global CR map between two CR manifolds? When is a global CR map already determined locally or even by the infinite jet at one point? Another aspect concerns CR functions. When is a CR function on a real submanifold of a complex manifold the restriction of a holomorphic function, or the limit of holomorphic functions, defined on some open subset of the complex manifold?

In a series of seminal papers (some jointly with X. Huang, P. Ebenfelt, and D. Zaitsev) they showed, under some natural nondegeneracy conditions, that germs of smooth CR maps between two real analytic hypersurfaces always extend to global CR maps which, moreover, in the case of algebraic hypersurfaces (and even for the higher codimensional case), must be algebraic maps. Furthermore, formal equivalence of real submanifolds implies biholomorphic equivalence. Many of the methods which they developed for the results, such as those of Segre sets and mappings, have since become major tools in the field.

For the basic problem of when CR functions are boundary values of holomorphic functions Baouendi and Rothschild made a number of fundamental contributions. In addition, Baouendi, jointly with F. Treves, showed that any CR function on a smooth CR submanifold of $\mathbf{C}^n$ is a limit of holomorphic functions and that any CR function on a smooth hypersurface of finite type extends holomorphically to at least one side.

The operators which are sums of squares of vector fields play an important role in the study of CR manifolds. Baouendi, mostly in joint work with C. Goulaouic, gave necessary conditions for analytic hypoellipticity of such operators with analytic coefficients, and also discovered some remarkable counterexamples to analytic hypoellipticity.

Rothschild, in a joint paper with E. Stein, introduced Lie group methods to prove L^p and Hölder estimates for the sum of squares operators as well as the boundary Kohn

Laplacian for real hypersurfaces. In later joint work with L. Corwin and B. Helfer, she proved analytic hypoellipticity for a class of first order systems. She also proved the existence of a family of weakly pseudoconvex hypersurfaces for which the boundary Kohn Laplacian is hypoelliptic but does not satisfy maximal L^2 estimates.

The work of Baouendi and Rothschild has had and continues to have tremendous impact on the theory of several complex variables.

Biographical Sketch: M. Salah Baouendi

M. Salah Baouendi, born in 1937, received his B.S. from the Université de Paris in 1961 and his Ph.D. from the Université de Paris, Orsay, in 1967. He held positions in Paris and at the University of Tunis, the Université de Nice, Purdue University, the University of Chicago, and Rutgers University before assuming his present position as professor at the University of California, San Diego. He received the Prix d'Aumale from the French Academy of Sciences (1969) and was an invited speaker at the International Congress of Mathematicians in Vancouver (1974). He has served on several AMS committees and was a member of the AMS Council.

Biographical Sketch: Linda Preiss Rothschild

Linda Preiss Rothschild, born in 1945, received her B.A. from the University of Pennsylvania in 1966 and her Ph.D. from the Massachusetts Institute of Technology in 1970. She held positions at MIT, Tufts University, Columbia University, Princeton University, and the University of Wisconsin before assuming her present position as professor at the University of California, San Diego. She has been a member of the Institute for Advanced Study (1974–75, 1978, 1981–82) and was a fellow of the Alfred P. Sloan Foundation (1976–80). She has served on various committees of the AMS and was an AMS vice president from 1985 to 1987. She served as president of the Association for Women in Mathematics from 1983 to 1985.

About the Prize

The Bergman Prize honors the memory of Stefan Bergman, best known for his research in several complex variables, as well as the Bergman projection and the Bergman kernel function that bear his name. A native of Poland, he taught at Stanford University for many years and died in 1977 at the age of eighty-two. He was an AMS member for thirty-five years. When his wife died, the terms of her will stipulated that funds should go toward a special prize in her husband's honor.

The AMS was asked by Wells Fargo Bank of California, the managers of the Bergman Trust, to assemble a committee to select recipients of the prize. In addition, the Society assisted Wells Fargo in interpreting the terms of the will to assure sufficient breadth in the mathematical areas in which the prize may be given. Awards are made every one or two years in the following areas: (1) the theory of the kernel function and its applications in real and complex analysis, and (2) function-theoretic methods in the theory of partial differential equations of elliptic type with attention to Bergman's operator method.

—Allyn Jackson

McKay and Perkins Awarded CRM-Fields Prize

JOHN MCKAY, Concordia University, and EDWIN PERKINS, University of British Columbia, have been named joint winners of the CRM-Fields Prize for mathematics for 2002–2003. The prize, presented annually by the Centre de Recherches Mathématiques (CRM) in Montreal and The Fields Institute in Toronto, recognizes exceptional contributions by a mathematician working in Canada. It carries an award of $5,000, and recipients are asked to present lectures at both the CRM and The Fields Institute.

McKay's work revolves around the properties of finite groups, their representations, and their symmetries. He has launched two areas of mathematics by his observations and conjectures, one known as the McKay correspondence and the other called "monstrous moonshine", underlying the role of the largest sporadic simple group, which is known as the "monster". He is a pioneer in the use of computers as a tool in algebra, either in the study of sporadic groups (he is the codiscoverer of two such groups) or in the explicit computation of Galois groups. He also took part in one of the feats of computational algebra of our time, the proof of the nonexistence of a projective plane of order 10.

Perkins has made outstanding contributions to several areas of probability theory and is one of the world's leading probabilists. Much of his early work concerned the delicate analysis of the sample paths of stochastic processes. His most spectacular achievements are his contributions to the analysis of measure-valued diffusions, or "superprocesses", in which he has been a pioneer. His accomplishments include deep and surprising results about the support of super-Brownian motion, including identification of its Hausdorff dimension; the identification of the historical process as the correct way to understand genealogy in superprocesses; and the construction of a class of interacting superprocesses.

—From CRM and Fields Institute announcements

Petters Receives Blackwell-Tapia Prize

ARLIE O. PETTERS of Duke University has been selected as the first recipient of the David Blackwell and Richard A.

Tapia Prize. Petters's chief research interests are in the field of mathematical physics. His current research includes the development of a rigorous mathematical theory of light deflection in gravitational fields and the investigation of the observational consequences of the theorems in such a theory.

The Blackwell-Tapia Prize has been established by the Mathematical Sciences Research Institute (MSRI) and Cornell University in honor of David Blackwell and Richard A. Tapia, distinguished mathematical scientists who have been inspirations to more than a generation of African American and Hispanic American students and professionals in the mathematical sciences. The prize will be presented every other year to a mathematical scientist who has contributed significantly to his or her field of expertise and who has served as a role model for mathematical scientists and students from underrepresented minority groups or who has contributed in other significant ways to the addressing of the problem of the underrepresentation of minorities in mathematics.

—From an MSRI announcement

Mathematical Society of Japan Prizes Awarded

The Mathematical Society of Japan (MSJ) has announced the awarding of several prizes.

The Autumn Prize of the Mathematical Society of Japan for 2002 was awarded to YASUMASA NISHIURA of Hokkaido University for his distinguished contributions to pattern dynamics for reaction-diffusion systems. The Autumn Prize is given to an individual who has made outstanding contributions within the past five years to mathematics in the highest and broadest sense.

The 2002 Geometry Prize was awarded to KAZUYOSHI KIYOHARA, Hokkaido University, for his study of Riemannian manifolds whose geodesic flows are integrable and C_l metrics, and to HAJIME TSUJI, Tokyo Institute of Technology, for his work on existence and applications of singular Hermitian metrics in algebraic geometry. Both Kiyohara's and Tsuji's work contributed major and fundamental advances in geometry.

The Analysis Prize, inaugurated in 2001, has been awarded to the following three mathematicians: JUNJIRO NOGUCHI, Tokyo University, for contributions to Nevanlinna theory in several complex variables and geometric complex analysis; TADAHISA FUNAKI, Tokyo University, for outstanding contributions in statistical mechanics on interface models and stochastic analysis; and EIJI YANAGIDA, Chiba University, for insightful research on nonlinear diffusion equations.

The Takebe Prize for outstanding research was established to encourage young mathematicians in their research. The Takebe Senior Prize is awarded to recipients chosen from nominations by members of the Mathematical Society of Japan. The Takebe Junior Prize is awarded to self-nominated applicants. The Takebe Prizes for 2002 were awarded to the following mathematicians:

Takebe Senior Prize: NARUTAKA OZAWA, University of Tokyo, for the study of applications of operator spaces to C^* algebras; HIDEO KUBO, Shizuoka University, for the study of the asymptotic behavior of solutions of nonlinear wave equations in higher dimensional spaces; and ATSUSHI SHIHO, Tohoku University, for the study of the crystalline fundamental group.

Takebe Junior Prize: KAZUHIRO ICHIHARA, Tokyo Institute of Technology, for the study of Dehn surgery on 3-manifolds and essential surfaces; YUSUKE OKUYAMA, Shizuoka University, for the study of irrationally indifferent periodic points in complex dynamics; SHINICH KOBAYASHI, Tokyo University, for the study of Iwasawa theory of elliptic curves with supersingular reduction; SHIN SATO, Chiba University, for the study of projections of surface knots; HITOSHI TANAKA, Gakushuin University, for the study of weighted norm inequalities for the Kakeya maximal function; and TAKAKO FUKAYA, Tokyo University, for the study of K_2 Coleman power series and their applications.

—From a Mathematical Society of Japan announcement