2007 Wiener Prize

The 2007 AMS-SIAM Norbert Wiener Prize in Applied Mathematics was awarded at the Joint Mathematics Meetings in New Orleans in January 2007.

The Wiener Prize is awarded every three years to recognize outstanding contributions to applied mathematics in the highest and broadest sense (until 2001, the prize was awarded every five years). Established in 1967 in honor of Norbert Wiener (1894–1964), the prize was endowed by the Department of Mathematics of the Massachusetts Institute of Technology. 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 Wiener Prize is chosen by a joint AMS-SIAM selection committee. For the 2007 prize, the members of the selection committee were: Percy A. Deift (chair), David B. Mumford, and Stanley J. Osher.

The previous recipients of the Wiener Prize are: Richard E. Bellman (1970), Peter D. Lax (1975), Tosio Kato (1980), Gerald B. Whitham (1980), Clifford S. Gardner (1985), Michael Aizenman (1990), Jerrold E. Marsden (1990), Hermann Flaschka (1995), Ciprian Foias (1995), Alexandre J. Chorin (2000), Arthur T. Winfree (2000), and James Sethian (2004).

The 2007 Wiener Prize was awarded to CRAIG TRACY and HAROLD WIDOM. The text that follows presents the selection committee's citation, a brief biographical sketch of each awardee, and their response upon receiving the prize.

Craig Tracy

Harold Widom

Citation

Craig Tracy and Harold Widom have done deep and original work on Random Matrix Theory, a subject which has remarkable applications across the scientific spectrum, from the scattering of neutrons off large nuclei to the behavior of the zeros of the Riemann zeta-function.

The contributions of Tracy and Widom center around a connection between a class of Fredholm determinants associated with random matrix ensembles on the one hand, and Painlevé functions on the other. Most notably, they have introduced a new class of distributions, the so-called Tracy-Widom distributions, which have a universal character and which have applications, in particular, to Ulam's longest increasing subsequence problem in combinatorics, tiling problems, the airline boarding problem of Bachmat et al., various random walker and statistical mechanical growth models in the KPZ class, and principal component analysis in statistics when the number of variables is comparable to the sample size.

The committee also recognizes the earlier work of Craig Tracy with Wu, McCoy, and Barouch, in which Painlevé functions appeared for the first time in exactly solvable statistical mechanical models. In addition, the committee recognizes the seminal contributions of Harold Widom to the asymptotic analysis of Toeplitz determinants and their various operator theoretic generalizations.

Biographical Sketch: Craig Tracy

Craig Arnold Tracy was born in England on September 9, 1945, the son of Eileen Arnold, a British subject, and Robert C. Tracy, an American serving in the U.S. Army. After immigrating to the United States as an infant, Tracy grew up in Missouri where he attended the University of Missouri at Columbia, graduating in 1967 as an O. M. Stewart Fellow with a B.S. degree in physics. He began his graduate studies as a Woodrow Wilson Fellow at the State University of New York at Stony Brook, where he wrote his doctoral dissertation under the supervision of Barry M. McCoy. After postdoctoral positions at the University of Rochester (1973–75) and the C. N. Yang Institute for Theoretical Physics (1975–78), Tracy was at Dartmouth College for six years before joining the University of California, Davis, in 1984. He is currently Distinguished Professor of Mathematics at UC Davis. In 2002 Tracy was awarded, jointly with Harold Widom, the SIAM George Pólya Prize. He is a member of the American Academy of Arts and Sciences. Tracy has two daughters and three grandchildren. He is married to Barbara Nelson, and they reside in Sonoma, California.

Biographical Sketch: Harold Widom

Harold Widom is professor emeritus at the University of California, Santa Cruz. He grew up in New York City, where he attended Stuyvesant High School and the City College of New York. He did his graduate work at the University of Chicago, receiving his Ph.D. under the supervision of Irving Kaplansky. His first academic position was at Cornell University where, inspired by Mark Kac, he turned his attention to the study of Toeplitz and Wiener-Hopf operators. This influenced much of his subsequent research and led ultimately to his work (largely in collaboration with Craig Tracy) in integrable systems and random matrix theory.

He is a member of the American Academy of Arts and Sciences and in 2002 received, jointly with Tracy, the SIAM George Pólya Prize. He is an associate editor of *Asymptotic Analysis; Journal of Integral Equations and Applications*; and *Mathematical Physics, Analysis and Geometry*. He is an honorary editor of *Integral Equations and Operator Theory*.

Response

We are honored to be named the recipients of the 2007 AMS-SIAM Norbert Wiener Prize in Applied Mathematics. We thank the members of the Selection Committee for their consideration and in particular for their recognition of our field of random matrix theory and integrable systems. Underlying much of our own research have been Wiener-Hopf operators and Wiener processes, so it is especially gratifying to receive this prize, named for Norbert Wiener. We thank AMS and SIAM for this honor.

One of us (Tracy) would like to acknowledge the support, early in his career, from Barry M. McCoy, J. Laurie Snell, Tai Tsun Wu, and Chen Ning Yang. We both express our appreciation of Estelle L. Basor, with whom we wrote our first joint paper on random matrices.

And we thank the diverse group of researchers in random matrix theory and integrable systems for making this an exciting field in which to work.