Vladimir Rokhlin receives the William Benter Prize in Applied Mathematics

City University of Hong Kong (CityU) has awarded the William Benter Prize in Applied Mathematics 2014 to Vladimir Rokhlin, a master in algorithm who has advanced the frontiers of computational mathematics and engineering.

Vladimir Rokhlin, Professor of Mathematics and the Arthur K. Watson Professor of Computer Science at Yale University, has earned world-wide acclaim for his tremendous contributions in numerical analysis and applied mathematics, in particular for his work in the Analysis-based fast algorithms: Fast multipole methods (FMM), Nonuniform FFT, fast Laplace transform, fast Legendre transform, fast wavelet transforms in numerical analysis. Among them, the development of FMM, a mathematical technique jointly developed with Leslie Greengard, Silver Professor of Mathematics and Computer Science at New York University, has revolutionised the way engineers and scientists solve tough problems.

The William Benter Prize in Applied Mathematics, a biennial award that carries a cash prize of US$100,000, was set up by the Liu Bie Ju Centre for Mathematical Sciences (LBJ Centre) at CityU in 2010, to recognise outstanding mathematical contributions that have a direct and fundamental impact on scientific, business, finance and engineering applications.

The Prize was presented to Vladimir Rokhlin at the opening ceremony of the International Conference on Applied Mathematics 2014 organized by the LBJ Centre at CityU on 1 December 2014.

Biographical Sketch

Vladimir Rokhlin was born on 4 August 1952 at Voronezh, Russia. He received his Master of Science degree in mathematics from the University of Vilnius in Lithuania in 1973, and doctorate in Applied Mathematics at Rice University in Houston, Texas in 1983. From 1979 to 1985, he was a Senior Research Specialist at Exxon Production Research Company in Houston, Texas. He joined the Yale University in 1985, where he is now Professor of Mathematics and Arthur K. Watson Professor in Computer Science.

Vladimir Rokhlin has received many awards and honours for his achievements and contributions over the years. He is Member of the US National Academy of Sciences and Member of the US National Academy of Engineering. He and Leslie Greengard received the 2001 Leroy P. Steele Prize for a Seminal Contribution to Research. He is the recipient of the 2001 Rice University Distinguished Alumnus Award, and the 2011 Maxwell Prize from the International Council for Industrial and Applied Mathematics. He was also named an IEEE Honorary Member in 2006 and a Fellow of the Society for Industrial and Applied Mathematics in 2009.

Vladimir Rokhlin

Citation

Vladimir Rokhlin was the first person who took a systematic approach to combining approximation theory, the classical theory of special functions, and modern computer science to reduce the computational cost associated with the basic integral operators of mathematical physics.

Rokhlin has been at the centre of several breakthroughs in numerical analysis and applied mathematics. His work has fundamentally changed these disciplines and the ramifications of his breakthroughs will certainly take decades to be worked out. He has made several deep contributions to the solutions of integral equations, and this has had a great impact on scientific computation.

Rokhlin is the inventor and "leading exponent" of many fast mathematical algorithms for solving boundary value problems associated with the key differential equations of mathematical physics. Specifically, he is the originator of a family of computational schemes known as "Fast Multipole Methods" or simply "FMMs", which, by virtue of their computational efficiency, have revolutionized how scientists and engineers simulate physical phenomena ranging from gravitational interactions to biomolecular dynamics and electromagnetic fields and waves.

The impact of Vladimir Rokhlin's collective body of work is immeasurable. Today, iterative and direct solvers incorporating his high-order accurate FMMs are used by scientists and engineers to rapidly solve integral equations pertinent to the analysis of many body and boundary value problems with accuracies hitherto unachievable through any other method. In many fields, FMMs have enabled high-fidelity simulations of a scale previously thought impossible (often involving billions of densely coupled unknowns), led to new scientific and engineering breakthroughs, and evolved into the dominant simulation technique (often supplanting old and deeply engrained methods).

— News release from City University of Hong Kong