Stanley Osher Receives the William Benter Prize in Applied Mathematics

City University of Hong Kong (CityU) has awarded the William Benter Prize in Applied Mathematics 2016 to Stanley Osher of the Department of Mathematics at the University of California, Los Angeles (UCLA), for his significant contribution in developing and applying mathematics to solve real-world problems.

Osher is one of the most influential and active computational and applied mathematicians of our time. His seminal and fundamental contributions in developing mathematical methods and efficient algorithms, such as shock capturing schemes, level set methods, the Total Variation model and Bregman algorithms, have revolutionised many fields, ranging from computational fluid dynamics and multiphase problems to optimisation and image processing.

The William Benter Prize in Applied Mathematics was set up in 2010 by the Liu Bie Ju Centre for Mathematical Sciences at CityU in honour of Mr William Benter, the donor of the prize, for his dedication to, and generous support for, the enhancement of the University's strength in mathematics. The Prize recognises outstanding mathematical contributions that have had a direct and fundamental impact on scientific, business, finance and engineering applications. It includes a cash prize of US$100,000 and is given once every two years.

The Prize was presented to Stanley Osher at the opening ceremony of the International Conference on Applied Mathematics, organised by the Liu Bie Ju Centre for Mathematical Sciences at CityU on 30 May 2016.

Biographical Sketch

Stanley Osher was born in 1942 in New York, USA. He obtained his Bachelor of Science in 1962 from Brooklyn College, and his Master’s (1964) and PhD (1966) from New York University. He has been a Professor of Mathematics at the University of California (Los Angeles) since 1977. Before he joined UCLA, he was Professor of Mathematics at SUNY, Stony Brook University in New York, USA.

Osher has received many awards and honours for his achievements and contributions over the years. He is a Member of the US National Academy of Sciences and the American Academy of Arts and Sciences. He received the Carl Friedrich Gauss Prize 2014 at the International Congress of Mathematicians (ICM), the SIAM Kline Prize in 2005, and the Pioneer Prize at ICIAM 2003. He was a plenary speaker at the ICM in 2010 and gave the SIAM John von Neumann Lecture in 2013. He is one of the most highly cited researchers in both mathematics and computer science in the world, and over 200 of his papers listed in the ISI (Web of Science) have been collectively cited more than 24,000 times.

Citation

The methods invented or co-invented by Stanley Osher have spread far beyond the traditional numerical analysis and computational mathematics community.

Osher and his collaborators have made fundamental contributions in designing a class of simple and efficient numerical schemes that can capture discontinuities in solutions with high-order accuracy and stability. The most significant of these are the ENO (essentially non-oscillatory) scheme and WENO (weighted ENO) scheme, which have been extremely successful in applications such as aero and fluid dynamics, airplane design, computer vision and image processing.

Another major area of Osher’s research is the level set method, co-invented with James Sethian, which has revolutionised the handling of complicated interface geometry, dynamics and topological change on fixed grids. Their work has been applied to areas ranging from image processing and movie animation to semiconductor chip design and criminal prosecution.

Osher’s work with Rudin and Fatemi on the Total Variation model for image processing is one of the earliest and most influential work on PDE-based methods for image processing. Total Variation has also become the most popular and useful regularisation used in image processing, compressive sensing, medical imaging and inverse problems in general.

The Merriman-Bence-Osher scheme for diffusion generated motion by mean curvature helped found the field of threshold dynamics and has proven to be of great value in data classification, material science and elsewhere.

The most recent significant work of Osher is the development of a new class of very fast numerical methods for optimization problems. These are central to the new fields of compressive sensing, matrix completion, robust principal component analysis and related topics. This is one of the most important developments in current applied mathematics.

— News release from City University of Hong Kong