



## MATH-IMS Joint Applied Mathematics Colloquium Series The Chinese University of Hong Kong

This MATH-IMS Joint Colloquium Series is organized by Center for Mathematical Artificial Intelligence (CMAI), under Department of Mathematics and Institute of Mathematical Sciences (IMS) at The Chinese University of Hong Kong. The colloquium series focuses on mathematics and applications of artificial intelligence, big data and related topics.

**Date: Dec 8, 2023 (Friday)**

**Location and Time: LSB LT2, 4:00-5:00pm (Hong Kong Time)**

**Zoom link: <https://cuhk.zoom.us/j/92775210812>**

### **Sampling Strategies for Global Optimization**

**Speaker: Professor Björn Engquist**  
The University of Texas at Austin

**Abstract:** Most optimization methods are only guaranteed to converge to a local optimum. This is so for gradient descent, Newton's method, and Quasi-Newton methods. These methods need a good starting value to converge to the global optimum and that is where sampling comes in. If not much is known about the objective function the default in this exploring phase is uniform sampling. We will consider Markov Chain Monte Carlo methods with adaptive variance and show desirable properties in finding good starting values to exploit for a rapidly converging algorithm.

**Bio:** Prof. Bjorn Engquist received his Ph.D. in numerical analysis from Uppsala University in 1975. He has been Professor of Mathematics at UCLA, and Applied and Computational Mathematics at Princeton University. He was director of the Research Institute for Industrial Applications of Scientific Computing and of the Centre for Parallel Computers at the Royal Institute of Technology, Stockholm. Prof. Engquist came to The University of Texas at Austin in 2004, where he is Professor of Mathematics holding the Computational and Applied Mathematics Chair I, and is Director of the Oden Institute Center for Numerical Analysis. Prof. Engquist's research focuses on development, analysis and application of numerical methods for differential equations. His earlier work includes the development of absorbing or far field boundary conditions, homogenization theory and nonlinear high-resolution schemes for compressible fluid dynamics. Application areas have been acoustic and electromagnetic wave propagation, aerodynamics and flow in porous media. He has also been working on computational multi-scale methods and in particular the development of the Heterogeneous Multi-scale Method. Another recent focus is fast algorithms for wave propagation with applications in seismology. The application to seismology includes novel algorithms for seismic inversion. Prof. Engquist is a recipient of numerous distinctions and awards: e.g., a member of the American Academy of Arts & Sciences, a member of the Royal Swedish Academy of Sciences and the Royal Swedish Academy of Engineering Sciences, and an invited speaker at the International Congress of Mathematicians (1982 and 1998), the first SIAM James H. Wilkinson Prize in Numerical Analysis and Scientific Computing (1982), Peter Henrici Prize (2011), and George David Birkhoff Prize (2012). He was selected to the Norwegian Academy of Science and Letters in 2011.