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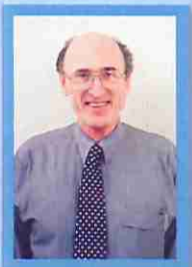


The Hong Kong
Polytechnic University
香港理工大學

Distinguished Lecture on

Numerical integration in high dimensions — lifting the curse of dimension

by



● Professor Ian Sloan

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Professor Ian Sloan is a Scientia Professor at the University of New South Wales. He is a Fellow of the Australian Academy of Science, and is currently President of the International Council for Industrial and Applied Mathematics. He recently won the 2005 Information based Complexity Prize for his research on constructive methods for very high dimensional integration.

Abstract:

Numerical integration in high dimensions confronts us with the curse of dimensionality — the number of function values needed to obtain an acceptable approximation can grow exponentially in the number of dimensions d . The exponential increase is clearly inevitable with any form of product integration rule, and for many theoretical settings is now known to be unavoidable no matter how the integration rule is chosen.

It has been known since 1998 that the curse of dimensionality can in principle be overcome within the "weighted Sobolev space" setting introduced by Sloan and Wózniaowski, if the "weights" that describe the behaviour with respect to different variables satisfy a certain (necessary and sufficient) condition. In that work it was shown that, under the appropriate condition on the weights, there exist integration rules for which the "worst-case error" is bounded independently of d . That 1998 result was non-constructive, giving no clue as to how we might construct "good" integration rules. More recently it has been shown that "good" rules can be found within the much smaller class of (shifted) lattice rules, and even more recently that good rules can be constructed one component at a time.

This talk will review these developments, from early existence proofs and non-constructive methods to recent fast constructions of good integration rules in hundreds or even thousands of dimensions, using hundreds of thousands of sample points.

Date: 22 June 2006 (Thursday)

Time: 4:00pm - 5:00pm (Reception starts at 3:30pm)

Venue: Room N113

The Hong Kong Polytechnic University

Language: English

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