The Hong Kong Polytechnic University
Department of Applied Mathematics

Colloquium

On

PDE with random coefficients as a high dimensional problem

by

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Abstract

Partial differential equations with randomness in the coefficients are now attracting serious attention from computational scientists, often under the heading of `uncertainty quantification'. A typical example is the flow of liquid through a porous material, with the permeability modelled as a random field. A number of groups have considered such problems, using methods that include `polynomial chaos', `stochastic Galerkin' and `stochastic collocation', all obtained by reformulating the problem as a deterministic problem in a high dimensional parameter space -- the dimensionality comes from the number of random variables needed to characterise the random coefficient. In a recent paper (Graham, Kuo, Nuyens, Scheichl, Sloan, J Comp Phys 2010) we carried out large-scale calculations using instead a quasi-Monte Carlo (QMC) method. In a later paper (Kuo, Schwab and Sloan, submitted recently) we gave the first theoretical analysis of QMC in such a context, and showed that a well designed QMC rule can give an optimal convergence rate (with respect to the number of samples) for appropriate expected values of functionals of the solution, under conditions that match recent `best N-term' results of Cohen, De Vore and Schwab. This talk will give an overview of recent developments for PDE with random coefficients.

Date : December 2, 2011 (Friday)

Time : 3:00 p.m. – 4:00 p.m.

Venue : HJ610, The Hong Kong Polytechnic University

*** * * ALL ARE WELCOME * * ***