Current advances in numerical techniques for PDEs with random input data

A short course organized by IIT Bhubaneswar
through the GIAN Scheme under MHRD, Government of India

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Overview

When building a mathematical model to describe the behavior of a physical system, one has often to face a certain level of uncertainty in the proper characterization of the model parameters and input data. Examples appear in the description of flows in porous media, behavior of living tissues, combustion problems, deformation of composite materials and atmospheric models, etc. The increasing computer power and the need for reliable predictions have pushed researchers to include uncertainty models, often in a probabilistic setting, for the input parameters of otherwise deterministic mathematical models.

In this series of lectures we focus on mathematical models mostly based on partial differential equations with stochastic input parameters (coefficients, forcing terms, boundary conditions, shape of the physical domain, etc.), and review the most used numerical techniques for propagating the input random data onto the solution of the problem, such as first/second order sensitivity analysis, Monte Carlo, Quasi Monte Carlo, Multi Level Monte Carlo and Polynomial Chaos Expansions.

The objective of this programme is to provide an opportunity for young researchers and students to learn why stochastic PDEs are necessary in applications, the theory and implementation issues related to the main techniques used in Uncertainty Quantification.

Course participants will learn the topics through lectures and tutorials. Also case studies and assignments will be shared to stimulate research motivation of participants.

Course Dates	**8th December to 13th December 2016** (Registration deadline: **30th November 2016**).
You Should Attend If…	▪ You are a researcher or faculty from academic/technical institutions ▪ Senior BTech/MTech/MSc/PhD students who are working in the field of Partial differential equations, Stochastic PDEs, Financial mathematics You already have experience in Programming with MATLAB/C/C++ Number of participants for the course will be limited to **fifty.**
Course Registration Fees	▪ **Students (BTech/MTech/MSc/PhD): Rs. 2,000.** ▪ **Participants from academic/technical/R&D institutions/industry: Rs. 4,000.** ▪ **Participants from abroad: US$ 200.** ▪ The above fee includes all instructional materials, computer use for tutorials and assignments and free internet facility. Payment should be made online to **"CEP, IIT Bhubaneswar"** (see next page for details). Please bring the payment receipt with you when you come to attend the course. ▪ Accommodation can be arranged in the institute hostel at a concessional prices strictly against payment. Limited number of travel grants (III AC train fare) and accommodation are available.

The Faculty

Prof. Fabio Nobile,
Chair Professor in Scientific Computing and Uncertainty Quantification
EPFL Switzerland

Dr. Fabio Nobile is an Associate Professor in Mathematics at the Mathematics Institute of Computational Science and Engineering (MATHICSE), Ecole Polytechnique Federale de Lausanne, Switzerland. He earned his PhD in Mathematics at EPFL, Switzerland in 2001. He previously held the position of Assistant Professor in numerical analysis at the Department of Mathematics, Politecnico di Milano, Italy. He is awarded the second prize at the 12th Leslie Fox Prize in 2005. He is author of more than 50 publications in international journals. He is member of the editorial board of 4 international journals. His main research activity is in numerical approximation of PDEs with random input data, numerical solution of fluid-structure interaction problems, simulation of the cardiovascular system.

https://people.epfl.ch/fabio.nobile;   http://csqi.epfl.ch/

Dr. Rajesh Kumar is a Visiting Assistant Professor in the School of Basic Sciences (Mathematics) at IIT Bhubaneswar, Bhubaneswar, India. He holds a PhD in Mathematics from OVGU Magdeburg, Germany and M.Sc. from TU Kaiserslautern Germany and Johannes Kepler University Linz, Austria under Erasmus Mundus fellowship. His research interests are partial integro-differential equations, numerical analysis of PDEs, finite volume analysis, conservation laws and low rank tensor approximations for PDEs with random data.

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Dr. A.D. Banik is an Assistant Professor in the School of Basic Sciences (Mathematics) at IIT Bhubaneswar, India. He received his PhD from IIT Kharagpur, India. His main research interests include continuous-time queueing theory and applied probability models and their applications in operations research, computer and communication networks.

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Important Dates

Registration deadline: 30th November, 2016

Classes start: 8th December, 2016
Classes end: 13th December, 2016

Venue

Indian Institute of Technology Bhubaneswar
Bhubaneswar, Odisha 751007, India

Course Coordinator

Principal Coordinator

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Register online at:
http://www.gian.iitkgp.ac.in/GREGN
(Registration deadline: 30th November, 2016)

Bank details for online payment of course fee:

A/C Name: CEP, IIT Bhubaneswar
A/C No: 24282010001960
IFSC Code: SYNB0002428
Bank Name: Syndicate Bank
Branch Address: IIT, Bhubaneswar