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GIAN
GLOBAL INITIATIVE OF ACADEMIC NETWORKS

A short course on

Computation Efficiency Enhancement Techniques in Forward and Inverse Problems

June 19-23, 2018 at National Institute of Technology, Durgapur

Overview

Sensors, data acquisition, and real-time analysis are ubiquitous these days. Wireless communication industry has been in the forefront of making them available for common usage. Other industries including biomedical, automotive, aviation, and energy are employing sensors to improve operational efficiency, reliability, and maintainability in respective sectors. Designing sensors and processing the acquired data, in many instances, involve dealing with forward and inverse problems. The objective of this short course is to familiarize participants with such problems and solution techniques, drawing illustrative examples from multidisciplinary domains.

Forward and inverse problems associated with sensor design and data analysis often require solving a set of boundary value problems involving differential and/or integral equations in conjunction with optimization techniques. There are many numerical methods to solve such problems including a few commercial ones. However, applying these methods directly may become computationally intractable, particularly for large scale industrial applications where degrees of freedom may easily run into millions. There has been a significant improvement in the use of high performance computing platforms to mitigate such problem. Equally important are the computation efficiency enhancement techniques. This short course begins with an overview of forward and inverse problems and then describes existing solution methods. Various techniques are presented to enhance computation efficiency. These include wavelet-based approach for hierarchical solution, dimension reduction techniques, and a combination of deterministic and evolutionary methods for optimization. Examples from multidisciplinary science and engineering fields are considered to illustrate the approach.

Objectives

The primary objectives of the course are:

- Expose participants to multidisciplinary aspects of sensor design and data analysis
- Provide theoretical understanding of forward and inverse problems and their solutions
- Familiarize with efficient techniques to solve large computationally complex problems
- Guide participants in developing algorithms and/or using existing ones to solve problems

Schedule/Location	June 19-23, 2018 National Institute of Technology, Durgapur Number of participants limited to 30
Participants	Students (Final year Bachelors and higher), faculty members, researchers, practicing engineers in electrical, electronics, mechanical, computer science, mathematics, physics, and geophysics.
Fees	Student/Research Scholar: Rs. 1000 Faculty: Rs. 2000 Industry/Research Organization: Rs. 4000 Participants from abroad: US $200 The above fees do not include accommodation.
Registration	http://www.gian.iitkgp.ac.in/GREGN Contact course coordinator
Accommodation	Contact course coordinator

The Faculty

Jaideva C. Goswami is a Chief Scientist at National Oilwell Varco in Houston. He is a former Professor of Electronics and Communication Engineering at the Indian Institute of Technology, Kharagpur. He is a Fellow of IEEE. His technical expertise and interests include multiphysics modeling, inverse problems, signal processing, subsurface sensor design, data analytics, and nuclear magnetic resonance.

Parimal Acharjee is an Associate Professor and Head of the Department of Electrical Engineering at National Institute of Technology, Durgapur, West Bengal, India. His research interests included computational analysis, soft-computing techniques and its application in power systems.

Rowdra Ghatak is a Professor and Head of the Department of Electronics and Communication Engineering at National Institute of Technology, Durgapur, West Bengal, India. His research interests included microwave and antenna design.

Course Co-ordinator

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