

Computational Techniques for Frequency-domain and Perturbation Analysis of Electronic and Multi-Physics Systems

Overview

This course focusses on the linearization of nonlinear systems, small-signal AC and eigen analysis, and the theory and numerics of stationary noise propagation through systems in any domain (including electronics, optics, nanotechnology, chemistry, biology, mechanics, etc.) modelled as differential-algebraic equations (DAEs). Before covering these topics, fundamentals of numerical modelling and simulation will be reviewed, with theory illustrated by examining and running code within Berkeley MAPP (a freely downloadable, open source, MATLAB-based simulation and modelling platform). MAPP will also be used to illustrate and understand how the theory of the main topics is translated into practice and put to use. Coverage of noise analysis will be preceded by a detailed review of probability and stochastic process concepts. Time permitting, an introduction to non-stationary noise (continuous-time random walks) will also be provided. HWs with coding components will be assigned daily. The course is suitable for junior/senior undergraduates and graduate students in any field of engineering or science. Successful completion of Alper Demir's course "Fundamentals of Numerical Modelling and Simulation of Multi-Physics and Multi-Domain Systems" (offered Jan 2-6, 2017, at IIT Madras) is strongly recommended as a pre-requisite for this course.

Dates	30 th January 2017 to 3 rd February 2017
Host Institute	IIT Madras
Credits	1
Maximum Number of Participants	25
You Should Attend If...	<ul style="list-style-type: none">▪ You would like to learn how to model and analyse noise in systems correctly, and/or understand probability and stochastic processes in a theoretically correct as well as intuitive and practically applicable way.▪ You would like to become familiar with techniques for linearized analysis of nonlinear systems and take advantage of the great insights they provide into system structure and behaviour.▪ You are interested in how existing (open-source or commercial) simulation and modelling tools work, understanding their pitfalls and working around them.
Course Registration Fees	<p>The participation fees for taking the course are as follows:</p> <ul style="list-style-type: none">▪ Student Participants: Rs. 1,000/-▪ Faculty Participants: Rs. 5,000/-▪ Government Research Organization Participants: Rs. 10,000/-▪ Industry Participants: Rs. 40,000/- <p>The above fees are towards participation in the course, the course material, computer use for tutorials and assignments, and laboratory equipment usage charges.</p> <p>Mode of payment: Demand draft in favour of "Registrar, IIT Madras" payable at Chennai The demand draft is to be sent to the Course Coordinator at the address given below.</p>
Accommodation	<p>The participants may be provided with hostel accommodation, depending on the availability, on payment basis. Request for hostel accommodation may be submitted through the link: http://hosteldine.iitm.ac.in/iitmhostel</p>

Course Faculty



Jaijeet Roychowdhury is a Professor of EECS at the University of California at Berkeley. His current research interests encompass novel computational architectures and paradigms, analog and mixed-signal model reduction and verification, multi-domain device modelling, and open-source infrastructures for reproducible research. He has a B.Tech degree (EE) from IIT

Kanpur in 1987 and a PhD degree (EECS) from Berkeley in 1993. Prior to Berkeley, Roychowdhury spent about 8 years each at the University of Minnesota and the Research Division of Bell Laboratories. Over the years, he has authored or co-authored seven best or distinguished papers; his work on MOS homotopies was cited as an Extraordinary Achievement by Bell Laboratories. He has served on the Technical Program Committees of ICCAD, DAC, DATE, ASP-DAC and other EDA conferences, on the Executive Committee of ICCAD, on the Nominations and Appointments Committee of CEDA, and as an Officer of CANDE. Roychowdhury co-founded Berkeley Design Automation, an analog simulation startup acquired by Mentor Graphics in 2014. He is a Fellow of the IEEE.

Course Coordinator

Name: Nagendra Krishnapura

Phone: +91-44-2257-4444

E-mail: nagendra@ee.iitm.ac.in

URL: <http://www.ee.iitm.ac.in/~nagendra/>