

IEEE TechSym 2014 : IEEE Students' Technology Symposium

Tutorial title: Modeling the High & Low Frequency Operations of Sub-Micron MOSFET Devices

Objectives: To train the audience with clear fundamentals on HF & LF device operation necessary for HF circuit designs. The audience will have hand-on training on device simulations and a qualitative concept of the various numerical modules inside a simulator and thereby a basic knowledge of how a simulator works and how are device simulators different from circuit simulators and SPICE.

Summary: In this tutorial we will begin with the major solutions of the detrimental effects of scaling on MOSFET performance. The study will primarily be focused on the Physics based analytical modeling of sub-micron devices pertaining to the technology nodes used in practical IC designs. The specific modeling approaches like BSIM, EKV, HiSim & PSP will be discussed as these standard models are used in circuit designing software. Then we will conclude the tutorial with the analysis of high frequency operation including the parasitics related to HF applications such as RFIC designs.

Speaker: Prof. Surya Shankar Dan,
Assistant Professor,
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Prerequisites: Introductory knowledge of semiconductor devices

Duration: Half-day tutorial

Biography: After completion of his PhD at the Indian Institute of Science, Bangalore in 2009, the speaker has served as a scientist in the European Organization for Nuclear Research (CERN) in Geneva and thereafter at the Swiss Federal Institute of Technology (EPFL) in Lausanne, both in Switzerland. After leaving Switzerland, he was at the Massachusetts Institute of Technology, Cambridge, USA when he decided to return back to India. He joined as a Visiting Assistant Professor at the Department of Electrical Engg, IIT Hyderabad, after which he joined as a Regular Assistant Professor at the Department of Electronics & Electrical Communication Engg, IIT Kharagpur in June 2013. He specializes in Physics based nano-electronic device modeling and simulation.

Reference texts:

1. Yannis P. Tsividis, "Operation and Modeling of the MOS Transistors"
2. Yuan Taur & Tak H. Ning, "Fundamentals of Modern VLSI Devices"
3. Simon M. Sze, "High Speed Semiconductor Devices"
4. Amalendu B. Bhattacharya, "Compact MOSFET Models for VLSI Designs"

Tutorial handouts: Photocopies of the presentation will be provided to the attendees in the tutorial.