



THE COMPUTER ENGINEERING RESEARCH CENTER

THE VLSI SEMINAR SERIES

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Towards Full-Wave Electromagnetic Simulation of Systems on Package and Chip

Abstract

Innovative and flexible design methodologies are required to sustain the thrust towards increased integration of high-speed digital, analog, RF, and mixed-signal technologies, including system-on-package and system-on-chip solutions. Indeed, prevailing signal integrity paradigms governing logical, circuit, and physical design are reaching their limits of practicality/predictive accuracy when applied in mixed-signal settings. To ensure system functionality, the interaction of (distributed) passives with nonlinear drivers/receivers and higher-order (tens of GHz) harmonics, their relative placement, and the background topography must all be accounted for. Full-wave broadband electromagnetic analysis, while in principle capable of delivering all data requisite to fully and accurately characterize the passives and the background topography (interconnects, substrates, other passives), is often impractical as present-day classical full-wave solvers invariably impose excessive computational demands. This talk will review some of our efforts to develop fast and parallel (FFT-accelerated) time-domain full-wave simulators and to hybridize them with SPICE-like circuit simulators. The computational bottlenecks associated with such hybrid simulators and several methods for overcoming them, such as asynchronous time-stepping techniques, will be discussed. Various applications of these fast, parallel, and hybrid simulators to the analysis of chip-, package-, board-, and system-level problems will be shown and future research directions will be highlighted.

Biography

Ali Yilmaz is an Assistant Professor in the Electrical and Computer Engineering Department of the University of Texas at Austin. He received the Ph.D. degree in electrical engineering from the University of Illinois at Urbana-Champaign in 2005. Before joining UT in 2006, he was a post-doctoral research associate at the Center for Computational Electromagnetics at the University of Illinois. His research interests include computational electromagnetics, high performance computing, parallel algorithms, and hybrid simulators.

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Coffee and cookie will be served. For more information about the VLSI Seminar Series, please visit <http://www.cerc.utexas.edu/vlsi-seminar/>