

Nonstationary Low Frequency Noise in Switched MOSFET Circuits and Circuit Simulation

by

Alper Demir

Date and Time: December 5th, 2019 (Thursday), 12:30

Place: Room Z23, Computer Engineering Building, GTU

All interested are cordially invited.

ABSTRACT:

Modeling and analysis of low frequency noise under strongly time-varying bias conditions is a long-standing open problem in circuit simulation. In this talk, I will start with a brief tutorial introduction to noise modeling and analysis in electronic circuits. I will then present the background on the nonstationary low frequency noise modeling problem in circuit simulation and the legacy noise models. The computational modeling and analysis framework we have developed solves the problem and is based on an analogy that relates low frequency noise in transistors and electronic circuits to stochastic behavior of ion channels in biological neurons and stochastic chemical kinetics. I will present results on electronic circuit examples, namely switched MOSFET circuits and oscillators, which show that our computational models implemented in an electronic circuit simulator correctly predict the impact of nonstationary low frequency noise that match measurement data, whereas the legacy noise models produce erroneous results.

This talk is based on joint work with Dr. Gokcen Mahmutoglu (PhD, Koc University 2015).

BIOGRAPHY:

Alper Demir graduated from Ankara Fen Lisesi, and subsequently received the BS degree from Bilkent University and the MS and PhD degrees from the University of California at Berkeley. Prof. Demir spent time at Motorola (Summer 1995), Cadence Design Systems (Summer 1996), Bell Laboratories Research (1997-2000), CeLight (2000-2002), MIT (Summer 2002, Spring 2017), and UC Berkeley (2009-2010). He has been with Koc University as a faculty member since 2002. His work on noise won several best paper awards: 2002 Best of ICCAD Award, 2003 and 2014 IEEE/ACM William J. McCalla ICCAD Best Paper Awards, and the 2004 IEEE Circuits and Systems Society Guillemin-Cauer Award. He was named an IEEE Fellow in 2012 for his contributions to stochastic modeling and analysis of phase noise.