New Directions in Analog/Mixed-Signal Design and Test

- **The Focus of** this September/October issue is on analog/mixed-signal CAD.

  The special issue starts with an article on STTRAMs titled “Retention Testing Methodology for STTRAM.” The problem with STTRAMs is their retention time that has shifted to a few microseconds due to variations and others effects. Iyengar et al. propose a novel design-for-test solution for that purpose.

  A new design space exploration technique is introduced in “Efficient Global Optimization of Analog Circuits Using Predictive Response Surface Models on Discretized Design Space.” Lee and Kim propose to discretize the continuous design space and then to search the same through simulation with response surface models (RSMs).

  In “Using Presilicon Knowledge to Excite Nonlinear Failure Modes in Large Mixed-Signal Circuits” the authors deal with the problem of testing under every input and its variation due to manufacturing variability. Mukherjee and Li therefore propose an information-theoretic ranking scheme for parameters in order to make decisions for design-for-test.

  The article “Verifying Inevitability of Oscillation in Ring Oscillators Using the Deductive SOS-QE Approach” verifies that a ring oscillator will start to oscillate from almost all initial voltage values.

  A new design method for mixed-signal systems with an asynchronous control is presented by Dubikhin et al. The authors combine the work on asynchronous circuit design techniques and formal verification of analog circuits.

  Finally, in “EM-Based On-Chip Aging Sensor for Detection of Recycled ICs,” He et al. describe a security problem that recycled ICs pose. As a solution, a lightweight aging sensor for electromigration (EM) is presented.

In our Departments, we have two Perspectives articles in this issue. In “Mixed Criticality Systems—A History of Misconceptions?” Ernst and Di Natale describe the current situation with respect to the mixed criticality systems, i.e., systems in which the subsystems have different levels and requirements of criticality. This Perspectives article sheds light onto different points of view from academia and industry, it discusses standards and application domains, and as such it serves as an introduction to a reader that is unfamiliar with the topic.

The other Perspectives article by Khorrami et al. on “Cybersecurity for Control Systems: A Process-Aware Perspective” describes and evaluates the large impact that cyberattacks may have on industrial control systems. Besides describing the problem, the authors outline promising approaches to cope with this rapidly growing phenomenon.

Magdy Abadir, our Interviews editor, presents an interview with Ken Hansen, Chief Executive Officer at the Semiconductor Research Corporation (SRC). Hansen talks about the status and plans of SRC and its relationship with academia.

My thanks go to all who contributed to this issue of IEEE Design&Test with special thanks to the Guest Editors Xin Li, Chandramouli Kashyap, and Chris J. Myers for creating this Special Issue on Challenges and Opportunities in Analog/Mixed-Signal CAD.

As always, please contact me at henkel@kit.edu for any questions, ideas, or inspirations for future IEEE D&T content that you may have. Enjoy reading this issue.