Editorial

Vishwani D. Agrawal

Received: 31 March 2014 / Accepted: 31 March 2014 / Published online: 8 April 2014
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This issue contains six papers and two letters. Topics covered are memory reliability, soft errors, RF testing, test time reduction, test data compression, and analog circuit diagnosis. Several of these papers have originated from presentations at recent conferences and workshops. The first paper was initially presented at the 2012 Latin American Test Workshop, Quito, Ecuador. Second, fifth and sixth papers appeared at the 2013 Latin American Test Workshop, Cordoba, Argentina. In addition to our regular editors, two guest editors, Raoul Velazco and Leticia Maria Bolzani Poehls, helped with the processing of these papers for the journal and we are thankful to them. The third paper of this issue is from the 2013 European Test Symposium, Avignon, France, for which Giorgio Di Natale, the guest editor, deserves appreciation.

As semiconductor memories become larger and faster, concerns about their reliability grow. Some related issues are addressed in the first three papers. In the first paper, Ceratti, Copetti, Bolzani, Vargas and Fagundes from Catholic University of Rio Grande do Sul – PUCRS, Porto Alegre, Brazil propose the design of an on-chip aging sensor (OCAS). Memory cells in each SRAM column are monitored by a separate OCAS for NBTI (negative bias temperature instability) aging. The OCAS itself is powered off during inactive periods so that it ages slower than the memory cells it is monitoring.

In the second paper, Somha and Yamauchi from Fukuoka Institute of Technology, Fukuoka, Japan suggest that margins for the screening test of an SRAM should consider certain time-dependent effects modeled by random telegraph noise (RTN).

In the third paper, Evain and Gherman from CEA, LIST, Gif sur Yvette, Cedex, France, and Savin from CEA, LETI, MINATEC Campus, Grenoble Cedex, France propose a method of recovering from certain kind for failures in memories. These failures cause erasure of data. The suggested method for detecting an erasure is to compare the measured value during the read operation against multiple reference thresholds.

Continuing with the reliability theme, the fourth paper discusses soft errors. These errors are believed to be caused by radiation whose sources can be extra-terrestrial. The radiation produces random signal changes some of which, due to masking by the hardware, produce no output errors. Arasteh and Rahmani of Islamic Azad University, Tehran, Iran and Miremadi of Sharif University of Technology, Tehran, Iran examine software implementations of computing algorithms and report additional masking of soft errors in software.

In the next article, Bhatta, Banerjee, Deyati, Tzou and Chatterjee of Georgia Institute of Technology, Atlanta, Georgia, USA discuss their research on testing of radio frequency (RF) components. Their focus is on reducing the cost of traditional measurement where a signal is sampled at least as fast as the Nyquist rate. The authors propose a lower cost method using incoherent undersampling. They provide an algorithm for signal reconstruction and examine the accuracy and limitations.

In the sixth paper, Venkataramani, Sindia and Agrawal from Auburn University, Auburn, Alabama, USA formulate a theorem on digital circuit test time under power constraint. They show that for minimum test time the energy must be consumed at the highest allowable rate, a condition achieved by their aperiodic test. The authors also examine the possibility of reducing the test time by suitably lowering the supply voltage.

The first of the two Letters is authored by Yuan, Mei, Song and Guo of Beijing University of Technology, Beijing, China.

V. D. Agrawal (✉)
Department of ECE, Auburn University, 200 Broun Hall, Auburn,
AL 36849, USA
e-mail: vagrawal@eng.auburn.edu

Their test data compression method can achieve up to 71.73 % compression ratio for some of the ISCAS'89 benchmark circuits.

The second Letter is authored by Y. Xie, Li, X. Xie and Zhou from University of Electronic Science and Technology

of China, Chengdu, China and S. Xie from Chengdu Technological University, Chengdu, China. Using the measured frequency response the authors partially recreate the function of an analog circuit under test and thereby attempt to diagnose faults.