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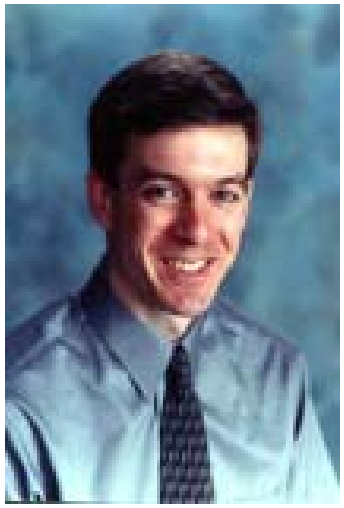

**N. Scott Barker**
**University of Virginia**
**Charlottesville, VA**

*Department Colloquium*

**Electrical Engineering and Computer Science**

CASE WESTERN RESERVE UNIVERSITY EST. 1826

# Distributed RF-MEMS Circuits

## *Abstract*

In order to reduce the packaging requirements for RF-MEMS devices we have developed a switched capacitor technology with minimal contact. Although this switched capacitor design results in a reduced capacitance ratio in the range of 5-10 we have also developed circuit designs for phase shifters and tunable matching networks (and the same can be done with filters) which do not require a capacitance ratio over 10. In addition to packaging, another Achilles' heel for RF-MEMS has been the uncertainty in pull-down voltages due to residual stress that is built into the beam during fabrication. We have successfully identified the major contribution of this stress to thin-film gold beams and are now able to routinely fabricate thin-film (< 1 micron thick) gold cantilevers with almost zero tip deflection upon release, and fixed-fixed beams with a pull-down voltage that nearly matches the analytical model without the need for adding on an unknown stress term.

## *Bio*

N. Scott Barker received the B.S.E.E. degree from the University of Virginia in 1994 and the M.S.E.E. and Ph.D. degree in electrical engineering from the University of Michigan, Ann Arbor, in 1996 and 1999 respectively.

From 1999 to 2000 he was a staff scientist at the Naval Research Laboratory. In 2001 he joined the Charles L. Brown Department of Electrical and Computer Engineering at the University of Virginia, Charlottesville where he is currently an associate professor. His research interests include applying MEMS and micromachining techniques to the development of millimeter-wave and submillimeter-wave circuits and components. He has authored over 60 publications in this field and has recently started the company Dominion MicroProbes, Inc., to develop the THz frequency wafer-probe technology invented by his group at the University of Virginia.

Prof. Barker has served on the MTT-21 technical committee on RF-MEMS since 2000 and was the committee chair from 2008 to 2011. He has also served for many years on the IMS Technical Program Review Committee. This past year he served on the Steering Committee of IMS2011 in Baltimore, and he is the TPC vice-chair for IMS2014 in Tampa, FL. He served as an Associate Editor of the IEEE Microwave and Wireless Components Letters from 2008 to 2010 and is now an Associate Editor for the IEEE Transactions on Microwave Theory and Techniques.

Prof. Barker received the Charles L. Brown Department of Electrical and Computer Engineering New Faculty Teaching Award in 2006 and the Faculty Innovation Award in 2004. He is a recipient of the 2003 NSF CAREER Award, the 2000 IEEE Microwave Prize, and First and Second Place in the Student Paper Competition of the IEEE MTT-S International Microwave Symposium.

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