EE 298-12
Solid State Technology and Devices Seminar

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Analog and RF Transistor Performance Metrics

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Abstract

Performance metrics are key technology parameters used by both process device engineers and circuit designers to gauge the performance of their devices and circuits. Common analog metrics include device intrinsic gain, unity gain frequency fT, and flicker noise corner. For RF applications, metrics include maximum stable gavin (MSG), Unilateral gain (U), maximum frequency of oscillation fmax, linearity metrics such as harmonic and intermodulation distortion, and minimum achievable noise figure NFmin. This talk explores the origin and importance of these metrics and how they relate to device physics. Understanding these metrics also serves as an important feedback on device compact modeling, since often the accuracy and efficacy of a model will be judged using these metrics.

Bio

Ali M. Niknejad received the B.S.E.E. degree from the University of California, Los Angeles, in 1994, and his Master's and Ph.D. degrees in electrical engineering from the University of California, Berkeley, in 1997 and 2000. He is currently a professor in the EECS department at UC Berkeley and faculty director of the Berkeley Wireless Research Center (BWRC) and the BSIM Research Group. Prof. Niknejad is the recipient of the 2012 ASEE Frederick Emmons Terman Award for his textbook on electromagnetics and RF integrated circuits. He is also the co-recipient of the 2013 Jack Kilby Award for Outstanding Student Paper for his work on an efficient Quadrature Digital Spatial Modulator at 60 GHz and the 2010 Jack Kilby Award for Outstanding Student Paper for his work on a 90 GHz pulser with 30 GHz of bandwidth for medical imaging, and the co-recipient of the Outstanding Technology Directions Paper at ISSCC 2004 for co-developing a modeling approach for devices up to 65 GHz. He is a co-founder of HMicro and inventor of the REACH(™) technology, which has the potential to deliver robust wireless solutions to the healthcare industry. His research interests lie within the area of wireless and broadband communications and biomedical imaging. His focus areas of his research include analog, RF, mixed-signal, mm-wave circuits, device physics and compact modeling, and numerical techniques in electromagnetics.