State Key Laboratory of Terahertz and Millimeter Waves
香港城市大學 City University of Hong Kong

IEEE (HK) Section AP/MTT

Seminar On

Low Phase-Noise Waveform-Shaping Local Oscillator

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Date : **11 August 2026 (Tuesday)**

Time : **2:30 pm – 3:30 pm**

Venue : **Room 15-202, 15/F, State Key Laboratory of Terahertz and Millimeter Waves, Lau Ming Wai Academic Building, City University of Hong Kong**

Abstract

This talk reviews recent CMOS local-oscillator designs that push phase-noise Figure of Merit (FoM) through harmonic engineering in multi-core, transformer-coupled oscillators. It will introduce an 18.5–23.6 GHz Class-F^{23} oscillator using a circular triple-coupled transformer. It includes a 6th-order differential-mode resonator with extended 3rd harmonic, and a well-designed common-mode return path expands 2nd-harmonic impedance, without manual harmonic alignment for high Q-factor. It achieves a 192.6-dBc/Hz FoM with corner only ~140 kHz. In order to further enhance the FoM, It needs to boost the common-mode Q-factor of multi-core oscillators via an inter-core 1st-and-2nd-harmonic co-circulation scheme, boosting 2nd-harmonic Q by ~50% and reaching a record 199.1-dBc/Hz FoM over 14.0–17.3 GHz. Furthermore, a magnetically-isolated sub-sampling PLL based on 2nd-harmonic extraction is briefly introduced to show the role of oscillator design in a low-phase-noise LO.

Biography

Tongde Huang received the Ph.D. degree from the Department of Electronic and Computer Engineering, The Hong Kong University of Science and Technology, Hong Kong, China, in 2013. From 2014 to 2016, he was a Post-Doctoral Researcher with Chalmers University of Technology, Gothenburg, Sweden. From 2016 to 2017, he was a Researcher with the Microwave Electronics Laboratory, Chalmers University of Technology. He is currently a Professor with the School of Electronic and Optical Engineering, Nanjing University of Science and Technology (NJUST), Nanjing, China. His current research interests include GaN MMICs and CMOS RFIC, including front-end, ultralow power, and oscillator circuits.

***** ALL ARE WELCOME *****

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