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Exploiting Nonlinear Modeling and Dynamics to Improve the Performance of Sampling Phase-Locked Loops

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Pazmany Peter Catholic University, Budapest, Hungary

Date and Time: Friday, 26 April 2019, 4:30pm -5:45pm

Venue: Room **B6605**, City University of Hong Kong

Reception starts at 4:15pm

(Language: **English**)

Abstract

When nonlinear dynamics and chaotic behavior of a real circuit or system are studied then the mathematical model of the physical system is simplified first. The simplification makes the problem tractable from a mathematical point of view but the results achieved cannot be used to solve real engineering problems because many crucial system properties are neglected.

Sampling Phase-Locked Loop (SPLL), used in frequency synthesis, is a mixed signal processing feedback system which includes both analog and digital circuits and where the sampling time is not constant but is controlled by the feedback. To design an SPLL, all signals have to be determined both in the analog and in the discrete-time domains. An accurate nonlinear SPLL model will be developed in the talk and it will be shown how that nonlinear mathematical model can be used directly in the design and optimization of an SPLL system.

About the Speaker

Geza Kolumban, Fellow of IEEE, was graduated from and received his Ph.D. at the Technical University of Budapest and received his C.Sc. and D.Sc. degrees from the Hungarian Academy of Sciences. He spent 15 years in the telecommunications industry where he developed microwave circuits, PLL-based frequency synthesizers, and was involved in many system engineering projects from satellite telecommunications to microwave digital radio systems. After joining the university education he showed that chaos may exist in autonomous PLLs and established noncoherent chaotic communications as a brand new research direction. He developed DCSK and FM-DCSK, the most popular chaotic modulation schemes. He has been a visiting professor and researcher to UC Berkeley, PolyU and CityU in Hong Kong, University College Dublin and Cork, Ireland, EPFL, Lausanne, Switzerland, INSA-LATTIS Laboratory, Toulouse, France, TU Dresden, Germany, Beijing Jiaotong University, China. Prof. Kolumban has been providing consulting service for many companies from Samsung Advanced Institute of Technology to National Instruments. He is a full professor at the Pazmany Peter Catholic University, Budapest, Hungary and is an Adjunct Prof. at the Edith Cowan University, Perth, Australia.