香港城市大學
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Department of Electronic Engineering

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IEEE photonics SOCIETY

CITY UNIVERSITY OF HONG KONG
Department of Electronic Engineering

Presents a Seminar on

Synchronization of Semiconductor Lasers

by

Prof. Jia-Ming Liu

Electrical Engineering Department
University of California, Los Angeles

Date : 26 June 2009, Friday
Time : 4:30 – 5:30 pm
Venue: G6302, 6/F, Green Zone, Academic Building,
City University of Hong Kong

Abstract

Semiconductor lasers with external perturbation exhibit complex dynamics under various operating conditions. The dynamics of two properly coupled lasers can be synchronized. While the dynamical state of a laser is precisely controlled by properly adjusting the operational laser parameters, synchronization of two coupled lasers is maintained through different dynamical states, including the chaotic state. Two lasers can be either unidirectionally or bidirectionally coupled. In each case, many different coupling configurations are possible, each requiring its own conditions for synchronization. When broadband chaos is synchronized, encoding of message on the broadband chaotic waveform can be implemented for chaotic optical communications. Many different encoding and decoding schemes for chaotic communications have been developed and studied. In this talk, I will review the concepts and the requirements for synchronization of coupled semiconductor lasers. Both unidirectional coupling and bidirectional coupling will be discussed. The results of theoretical analysis and experimental work will be presented. The talk will conclude with the presentation of our work on chaotic optical communications using unidirectionally coupled, synchronized semiconductor lasers.

Biography

Jia-Ming Liu is Professor of Electrical Engineering at UCLA, visiting City University of Hong Kong on the Royal Society Kan Tong Po Visiting Professorship. He received the B.S. in Electrophysics from National Chiao Tung University in 1975 and became a Licensed Professional Electrical Engineer in 1977. He earned his M.S. and Ph.D. in Applied Physics from Harvard University, in 1979 and 1982, respectively. He was an Assistant Professor with the Department of Electrical and Computer Engineering, State University of New York at Buffalo from 1982 to 1983 and was a senior member of the technical staff with GTE Laboratories from 1983 to 1986. He joined the faculty of the UCLA Electrical Engineering Department in 1986. Professor Liu's research interests are in nonlinear optics, ultrafast optics, semiconductor lasers, photonic devices, optical wave propagation, nonlinear laser dynamics, chaotic communications, chaotic radar, and optical imaging. He is a fellow of the Optical Society of America, the American Physical Society, the IEEE, and the Guggenheim foundation.

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