Lasers and Electro-optics Society
Hong Kong Chapter

Seminar

Center for Advanced Research in Photonics
Department of Electronic Engineering
The Chinese University of Hong Kong

Ultrafast photonic signal processing

Professor Lawrence Chen
McGill University, Canada

Date : **13 November 2006 (Monday)**
Time : **2:00 P.M.**
Place : **Room 418, Ho Sin Hang Engineering Building,**
The Chinese University of Hong Kong, Shatin, Hong Kong

Abstract

Techniques for the generation, control, and manipulation of optical pulses attract considerable interest for numerous applications and have become increasingly important in many scientific areas. Of specific interest are techniques for pulse repetition rate multiplication (PRRM), which are used to obtain ultrafast optical pulse trains from a low repetition rate input pulse train, as well as for arbitrary waveform generation. In this presentation, we will overview our ongoing research on ultrafast photonic signal processing.

We will begin by discussing two approaches for generating ultrahigh repetition rate pulse trains, namely the temporal Talbot effect and superimposed linearly chirped fiber Bragg gratings. In the first case, we discuss some design considerations which must be accounted for in order to optimize the operation of PRRM based on the temporal Talbot effect and demonstrate techniques for achieving tunable operation. In the second case, we present the results generating 100 GHz and 4×100 GHz pulse trains from an input pulse train at 10 GHz.

In the second part of the presentation, we describe our recently developed direct temporal-domain approach for optimizing the response of optical filters to perform PRRM and pulse shaping. Using this approach, we design lattice-form Mach-Zehnder interferometers (LF-MZIs) for PRRM with arbitrary envelope shaping and show experimental results of devices fabricated in silica waveguides. We then consider 2D ring resonator arrays (RRAs) as an alternate filter configuration which provides increased capabilities for PRRM and arbitrary waveform generation. Simulation results are given.

Biography

Lawrence R. Chen received the B.Eng. degree in electrical engineering and mathematics from McGill University in 1995 and the M.A.Sc. and Ph.D. degrees in electrical and computer engineering from the University of Toronto in 1997 and 2000, respectively. In July 2000, he joined the Department of Electrical and Computer Engineering at McGill University where he is now an Associate Professor. He is spending the 2006-2007 academic year on leave at Queen's University, Kingston, ON, the University of Toronto, Toronto, ON, and the Universidad Politenica de Valencia, Spain. His research interests are in ultrafast photonics and fiber optics and include optical pulse shaping and signal processing, fiber lasers and amplifiers, optical code-division multiple access, microwave photonics, and fiber gratings. He has co-authored more than 125 journal and conference papers and is a contributing author of the book *Optical Code-Division Multiple Access: Fundamentals and Applications*, Taylor & Francis Group, 2006.

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

For enquiry, please contact Prof. Chester Shu Tel. 2609 8258 (email: ctshu@ee.cuhk.edu.hk)