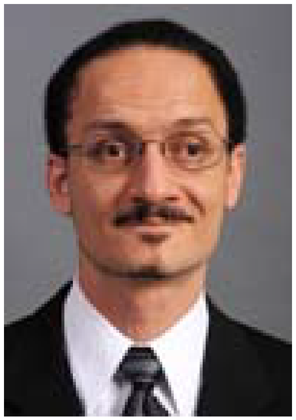
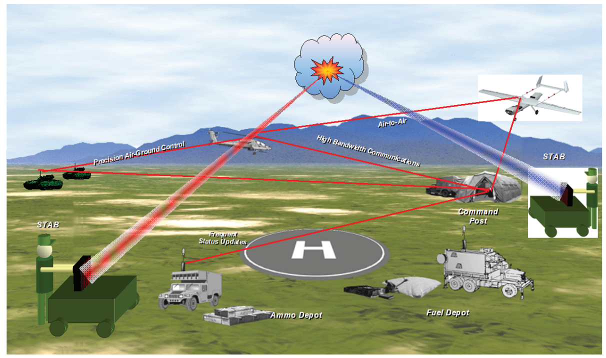
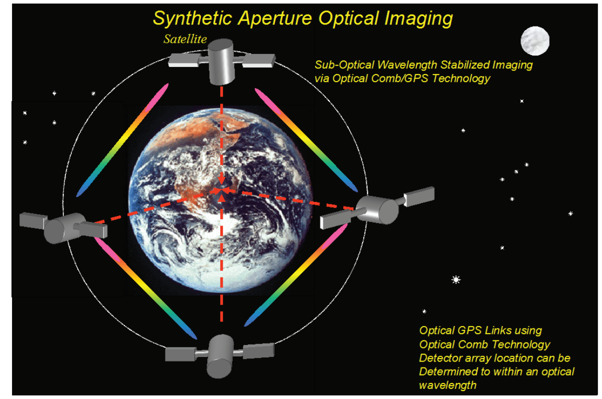
The Institute of OPTICS **Colloquium** UNIVERSITY OF ROCHESTER

Ultrafast Coherent Optical Signal Processing Technologies and Applications using Stabilized Optical Frequency Combs







Professor Peter J. Delfyett,
CREOL, The College of Optics & Photonics
University of Central Florida

BS in EE, CCNY 1981, MS EE, Rochester, 1983
M Phil and PhD in EE, CUNY 1987 - 1988
Bellcore 1988-1993
CREOL 1993 -

This presentation will highlight our recent results in the generation of stabilized frequency combs, and in developing photonic device technologies and approaches for filtering, modulating and detecting individual comb components. We then show how these technologies can be applied in signal processing applications such as arbitrary waveform generation, arbitrary waveform measurement, synthetic aperture imaging and matched filtering for pattern recognition

Special Time
11:00 am, Monday, Apr 4, 2011
Sloan Auditorium, Goergen 101
Refreshments served

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SCHOOL OF ENGINEERING
& APPLIED SCIENCES

Ultrafast Coherent Optical Signal Processing Technologies and Applications using Stabilized Optical Frequency Combs

Peter J. Delfyett,

CREOL, The College of Optics & Photonics, University of Central Florida

Abstract: The development of novel systems and devices for high speed communications, interconnects and signal processing are critical for next generation information based economies. Lightwave technologies offer the promise of high bandwidth connectivity from component development that is manufacturable, cost effective, and electrically efficient. The concept of optical frequency/wavelength division multiplexing has revolutionized methods of optical communications, however the development of optical systems using 100's of wavelengths present challenges for network planners. The development of compact, efficient optical sources capable of generating a multiplicity of optical frequencies/wavelength channels from a single device could potentially simplify the operation and management of high capacity optical interconnects and links. Over the years, we have been developing mode-locked semiconductor lasers to emit ultrashort optical pulses at high pulse repetition frequencies for a wide variety of applications, but geared toward optical communications using time division multiplexed optical links. The periodic nature of optical pulse generation from mode-locked semiconductor diode lasers also make these devices ideal candidates for the generation of high quality optical frequency combs, or multiple wavelengths, in addition to the temporally stable, high peak intensity optical pulses that one is accustomed to. The optical frequency comb enables a variety of optical communication and signal processing applications that can exploit the large bandwidth and speed that femtosecond pulse generation implies, and achieve the promised aggregate speed by spectrally channelizing the bandwidth, and using lower speed electronics for control of the individual spectral components of the mode-locked laser. This presentation will highlight our recent results in the generation of stabilized frequency combs, and in developing photonic device technologies and approaches for filtering, modulating and detecting individual comb components. We then show how these technologies can be applied in signal processing applications such as arbitrary waveform generation, arbitrary waveform measurement, synthetic aperture imaging and matched filtering for pattern recognition.

Biography: Peter J. Delfyett received the B.E.(EE) degree from the City College of New York in 1981, the M.S. degree in EE from the University of Rochester in 1983, the M. Phil and Ph.D. degrees from the Graduate School & University Center of the City University of New York in 1987 and 1988, respectively. His Ph.D. Thesis was focused on developing a real time ultrafast spectroscopic probe to study molecular and phonon dynamics in condensed matter using optical phase conjugation techniques.

After obtaining the Ph.D. degree he joined Bell Communication Research as a Member of the Technical Staff. In 1993 he joined the faculty of the College of Optics & Photonics and the Center for Research and Education in Optics and Lasers (CREOL) at the University of Central Florida, and currently holds the positions of University of Central Florida Trustee Chair Professor of Optics, ECE & Physics. He has published over 500 articles in refereed journals and conference proceedings, and has been awarded 30 United States patents.