KOÇ UNIVERSITY

Science – Math Seminar

Speaker: Fatih Yaman
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Date: Wednesday, Jan. 5, 2005
Time: 16:45 (Tea and cookies will be served at 16:30)
Place: Science building, Room Z42

Title: Fiber-Optic Parametric Amplifiers for Lightwave Systems

Abstract:

Fiber-optic parametric amplifiers (FOPAs) can be used in lightwave systems for several signal-processing applications including optical amplification, phase conjugation, and wavelength conversion. In this presentation I will focus on some of the recent advances in designing broadband FOPAs and some of the remaining challenges that need to be overcome. The well-known simple theory behind the nonlinear phenomenon of four-wave mixing is discussed first to provide the background material. It is then used to discuss and compare the performance of single-pump and double-pump FOPAs. A discussion about the design of dual-pump FOPAs and how they can provide a gain spectrum that is relatively uniform over a bandwidth larger than 100 nm is also included. In the second part of the talk I will focus on our work on dual-pump FOPAs. We have shown that performance of FOPAs is limited by imperfections in fibers and noisy pump sources. Fiber imperfections such as fluctuations in the dispersion parameters and birefringence along the fiber length limit the gain bandwidth of FOPAs to less than 50 nm. The noise that is created in producing high power pumps limits the optical signal-to-noise ratio of the amplified signal to less than 18 dB. In addition, the phase modulation of the pumps that is required for suppression of stimulated-Brillouin scattering causes unwanted modulations in the signal power.

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