Friday, October 17

FC 8:30am–10:00am Room 201B

Symposium on Soliton Techniques for Systems: 2

Mohammed N. Islam, *University of Michigan, Presider*

FC1 8:30am (Invited)

Massive wavelength division multiplexing in ultra-long distance soliton transmission, Linn F. Mollenauer, *Bell Labs, Lucent Technologies, Holmdel, NJ.* There is now demand for transoceanic fiber optic cable systems where the capacity of each fiber pair is several hundreds of Gbit/s. That capacity should further be in the form of "massive" wavelength division multiplexing, at 10 or even 20 Gbit/s per channel. It is now generally realized that the only way to achieve such performance is with one or another of the several possible soliton-based technologies. In this talk, I show how the combination of sliding-frequency filters and dispersion-managed solitons will enable such capacities in a robust and very practical way.

FC2 9:00am

Timing jitter reduction in a dispersion-managed soliton system, R.-M. Mu, V.S. Grigoryan, E.A. Golovchenko, A.N. Pilipetskii, T. Yu, C.R. Menyuk, *Department of Computer Sciences and Electrical Engineering, University of Maryland Baltimore County, Baltimore, MD 21250. E-mail: mu@umbc.edu.* We found theoretically that timing jitter reduction in a dispersion-managed soliton system depends on the pulse shape as well as its enhancement factor. We compared Monte Carlo simulations of the timing jitter to an analytical approach that uses the numerically determined pulse shapes and we found good agreement.

FC3 9:15am

Using otpical solitons to measure fiber properties, J.K. Andersen, G.A. Nowak, J.W. Lou, M.N. Islam, R.M. Fortenberry,* *University of Michigan, 1301 Beal Ave., 1214 EECS, Ann Arbor, MI 48109-2122. E-mail: jkander@eecs.umich.edu.* Measuring fiber nonlinearity of standard and DS fiber is becoming increasingly important for high speed TDM and WDM networks. By using the coupling between nonlinearity and dispersion in optical solitons, we measure the path-averaged effect of nonlinearity in fibers exceeding 20 km in length. For example, we measure an n_2/A_{eff} of $2.7*10^{-10}$ W^{-1} in 20 km of standard fiber, with an error within 5%. This method relies on a simple experimental setup and simulations using the split-step Fourier method. It is applicable to long lengths of fiber, unlike the standard SPM technique.

Hewlett Packard.

FC4 9:30am

Determination of optical fiber characteristics using solitons, P.K.A. Wai, F. Moldoveanu,* H.H. Chen,* Y.K. Tsang, *The Hong Kong Polytechnic University, ENC Department, Hung Hom, Kowloon, Hong Kong. E-mail: enwai@polyu.edu.hk.* A novel method of fiber characteristics measurement is proposed. It is shown that fiber parameters such as longitudinal dispersion profile can be determined by use of the input/output pulse shapes and a model of nonlinear light propagation in optical fibers. Issues related to practical implementation of the method are discussed.

University of Maryland.

FC5 9:45am

Bit-error-rate degradation resulting from timing jitter in soliton communication systems, Armando Nolasco Pinto, José Ferreira da Rocha, *Department of Electronic and Telecommunications, University of Aveiro, 3810 Aveiro, Portugal. E-mail: anp@ua.pt.* We present an analytical experession for the bit error rate in soliton communication systems taking into account the amplified spontaneous emission noise, soliton interaction, optical filtering, and receiver processing. We use a jitter model and this analytical formulation to study the bit error rate degradation resulting from timing jitter.

FD 8:30am–10:00am Room 202B

Laser Physics

James Kafka, *Spectra Physics Lasers Inc., Presider*

FD1 8:30am

Stable cavity modeling in support of unstable resonator design for high power lasers, D.L. Bullock, Chun-Ching Shih,* J.A. Betts,* *2127 Banyan Dr., Los Angeles, CA 90049. E-mail: ap240@lafn.org.* Adequate design of a high-power laser system often involves anchoring a model of the laser to the measured performance of the gain medium with a subscale stable optical resonator. The modeling of stable resonator performance is inherently difficult because of its multimode operation. A successful method for such modeling is presented.

TRW.

FD2 8:45am

Compact multiple-prism near-grazing-incidence grating solid-state dye lasers, F.J. Duarte, *Eastman Kodak Company, Rochester, NY 14652-3703. E-mail: fjduarte@kodak.com.* Solid-state multiple-prism near-grazing-incidence grating dye lasers have been configured in 70 mm cavity lengths by use of dye-doped PMMA gain media. In these experiments we have measured single-longitudinal-mode emission at linewidths in the 300 MHz range. Results that use double grating configuration also are presented.

FD3 9:00am

Spatial and temporal effects in surface-emitting second-harmonic generation, Yujie J. Ding, Jacob B. Khurgin,* *Department of Physics and Astronomy, Centers for Materials and Photochemical Sciences, Bowling Green State University, Bowling Green, OH 43403.* We have theoretically investigated rich and unique temporal, spatial, and spectral dependences of surface-emitting second-harmonic intensity from modelocked laser pulses with arbitrary pulse shapes. This work has been supported by AFOSR.

The Johns Hopkins University.

FD4 9:15am

Y^{2+}:CaF_2 crystal—new material for tunable lasers in the 1000–1450 nm spectral region, Valerii V. Ter-Mikirtychev,* *Faculty of Engineering, Kyoto Sangyo University, Kamigamo, Kita-ku, Kyoto 603, Japan. E-mail: ter@cc.kyoto-su.ac.jp.* Y^{2+} ($4d^1$ configuration) ion is proposed to be a new laser active optical center. As an example Y^{2+} in CaF_2 crystals demonstrates broad luminescence band with peak at 1146 nm and halfwidth of 2155 cm^{-1} at room temperature. Optical gain has been measured in CaF_2:Y^{2+} amplifier at 1150 nm wavelength. It is concluded that Y^{2+} doped crystals seem to be promising laser active materials for tunable solid-state lasers.

On leave from Russian Academy of Sciences.

FD5 9:30am

The spatial and polarization properties of laser beams during isotropic, Bragg acousto-optic diffraction, Chen-Wen Tarn, Ray S. Huang, *Department of Electronic Engineering, National Taiwan Institute of Technology, 43 Keelung Rd. Sec. 44, Taipei, 106 Taiwan. E-mail: ctarn@et.ntit.edu.tw.* The phenomena of laser beams deformation and polarization changing during the Bragg acousto-optic diffraction in isotropic media are studied. It is found that, during the acousto-optic interaction, not only the profiles of the diffracted light are changed but so are their states of polarizations.

FD6 9:45am

The spatial and polarization properties of laser beams during isotropic, Raman–Nath acousto-optic diffraction, Chen-Wen Tarn, Cheh-Wei Hsieh, *43 Keelung Rd. Sec. 44, Taipei, 106 Taiwan. E-mail: ctarn@et.ntit.edu.tw.* The phenomena of laser beams deformation and polarization changing during the Raman–Nath, acousto-optic diffraction in isotropic media are studied. It is found that, during the acousto-optic interaction, for the scattered light beams, their states of polarization are changed while their spatial profiles are almost in the same profiles as the incident light.