conference report

FIBER OPTICS EMPHASIS ON SINGLE MODE

The third biennial Symposium on Optical Fiber Measurements, sponsored by NBS in cooperation with the IEEE Optical Waveguide Communications Committee and the Optical Society of America, drew some 300 attendees to Boulder Oct. 2–3 to hear 25 contributed papers, several invited papers, and to attend two workshops on the general subject of optical fiber measurements. Papers reflected the international interest in fiber optics, with speakers coming from seven countries outside the U.S.

At the first symposium in 1980, the topic of major concern was attenuation in multimode fibers. Two years later at the 1982 meeting, the emphasis turned to bandwidth in multimode fibers with special interest in the prediction of bandwidth for concatenated fibers. At the most recent meeting, the attention was on single-mode fibers with less interest in multimode. This progression of topics follows the industrial trend, which started with multimode fibers and then shifted to single-mode in more recent years.

At the 1984 meeting, the main single-mode fiber concern was with the measurement of chromatic dispersion. In fact, a whole session was devoted to this topic. The remainder of this brief meeting report will summarize the single-mode topics and mention a few specific contributions.

Agreement Lacking

For single-mode fibers there is a need to determine the cutoff wavelength of the second-order mode and the mode field diameter of the fundamental mode. Both of these parameters are under study by standards groups and at present there is no international agreement on how mode field diameter should be measured or specified.

C. A. Millar of British Telecom Research Laboratories reported on a near-field method which gives both the shape of the mode field radial intensity distribution and the refractive index profile. R. Caponi et al. of CSELT, Italy, presented a novel approach to the determination of mode field diameter using an "optical computing" technique whereby a specially prepared mask is inserted in an optical system and mode field diameter is obtained by taking three single data points. Three papers were concerned with cutoff wavelength measurements. The results were interesting because conflicting curvature dependencies were reported. It appears more work needs to be done on how cutoff wavelength depends on fiber-bend curvature. N. K. Cheung and P. Kaiser of Bell Communications Research discussed cutoff wavelength values with respect to the system's operational wavelength. Those investigations measured modal noise, which can occur if operation is too close to the cutoff wavelength. They conclude that effective cutoff wavelength can be slightly greater (1.35 μm) than the system wavelength (1.30 μm).

Chromatic Dispersion

Chromatic dispersion in single-mode fibers was the subject of seven papers. A knowledge of chromatic dispersion allows one to determine the wavelength of zero dispersion and pulse broadening due to source linewidth. The earliest and most common method for determining chromatic dispersion utilizes a high-power Nd:YAG laser to produce Raman scattering in a single-mode fiber, thereby producing a tunable wavelength source of 150-ps-wide pulses.

R. A. Modavis and W. F. Love of the Corning Glass Works reported on a technique using five pulsed laser diodes and curve fitting to yield chromatic dispersion. K. Tatekura et al. of KDD, Japan, described a similar technique but instead measured the phase shift of cw light from sine-wave modulated laser diodes. Chromatic dispersion can also be determined on fiber lengths less than 1 m using an interferometric technique with a tungsten lamp and monochromator. M. J. Saunders and W. B. Gardner of AT&T Bell Laboratories reported using this technique to determine minimum dispersion wavelength and group delay per unit length. L. Oksanen and S. J. Halme of Helsinki University of Technology described numerical methods to extract group delays from interferometric data.

The Technical Digest for the Symposium on Optical Fiber Measurements, 1984, containing three- to four-page summaries of the papers, is available as NBS Special Publication 683 from the Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402 ($5.00)

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conference report

PROMISES OF LARGE-SCALE COMPUTATION

A conference on the Forefronts of Large-Scale Computational Problems (FF84), held at the National Bureau of Standards in Gaithersburg, MD, was organized on the hypothesis that large-scale computation will play an increasingly important role in science and industry, and that the spectrum of applications of large-scale computation will grow rapidly. Sponsorship was obtained through a consortium of industrial, academic, and government organizations, and the conference steering committee was chaired by Dr. David Wehrly of IBM.

Attending the June 25-27 conference were more than 400 engineers, scientists and others interested in current applications, new approaches and future trends in large-scale computation. A distinctive feature of the audience was the mix of researchers from academe and industry, hardware manufacturers, computer laboratory directors, and managers of R&D. Emerging computational methods and requirements which are held in common by a wide range of research activities were also featured prominently in FF84. The breadth of applications of speakers from industrial laboratories provided persuasive evidence that large-scale computation is being realized as a powerful, economic approach to seemingly intractable problems.

The application areas covered in the program, organized by B. L. Buzbee of Los Alamos National Laboratory and H. J. Raveche of the National Bureau of Standards, include medical imaging, materials science, pharmacology, biotechnology, physics, chemical synthesis, structural analysis, economics, fluid mechanics and movies.

Recent advances obtained from large-scale computation in such diverse topics as voltage characteristics in semiconductor devices, bone reconstruction in surgery, action of drug molecules at receptor sites, interaction of DNA with water, global economic modeling, and testing laws of nuclear physics were illustrated. The presentations revealed that exciting breakthroughs are possible in these areas if sufficient computing capability is forthcoming. Providing this new capability will require sizeable advances in state-of-the-art computing technology.

The FF84 Steering Committee, which has representation from industry, academe, and national laboratories, operates on the conviction that interdisciplinary interactions are essential to progress in the field of large-scale computation. The Steering Committee