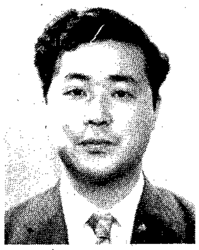
Sweden and is intended for maritime satellite communication in the L band. In 1976 he received a scholarship from the Sweden–America Foundation for studies in the United States. Since July 1976, he has been on a leave of absence from his position at Chalmers and is currently with Anaren Microwave, Inc., Syracuse, NY. At Anaren he has been working on the research, development, and production of couplers, baluns, power dividers, mixers, beam forming networks, and other microwave components in the frequency range 30 MHz–18 GHz.

J. David Rhodes (M'67) was born in Doncaster, Yorkshire, England, on October 9, 1943. He received the B.Sc., Ph.D., and D.Sc. degrees in electrical engineering from the University of Leeds, Leeds, England, in 1964, 1966, and 1974, respectively.

From 1966 to 1967 he was a Research Fellow in the Department of Electrical and Electronic Engineering at the University of Leeds and then joined Microwave Development Laboratories, Inc., Natick, MA, as a Senior Research Engineer. He currently holds a personal chair in the Department of Electrical and Electronic Engineering at the University of Leeds and is also a consultant in microwave engineering to Microwave Development Laboratories, Inc.

Dr. Rhodes was awarded the "Microwave Prize" by the professional group on Microwave Theory on Techniques in 1969, the IEEE Browder J. Thompson award in 1970, the J. J. Thompson award from the Institute of Electrical Engineers, London, in both 1971 and 1973, and the Guillemin-Cauer award by the Circuit and Systems Society in 1974.



Masao Saito (S'59–M'63) was born in Japan in 1933. He received the B.S., M.S., and Ph.D. degrees in engineering from the University of Tokyo, Tokyo, Japan, in 1956, 1958, and 1962, respectively.

Working for some time as a member of the Faculty of Engineering at the University of Tokyo, he is now serving as a Professor of Medical Engineering on the Faculty of Medicine there. His principal interest is in circuit and systems theory, especially its application to biological and medical systems. In circuit theory, he is interested in distributed-parameter systems, variable and adaptive systems, and multivariable network theory.

Dr. Saito is a member of the board of the Japan Society of Medical Electronics and Biological Engineering, Vice-President of the International Federation for Medical and Biological Engineering, and Vice-President of the World Association of Medical Informatics.

Overseas Abstracts

PAPERS FROM JOURNALS PUBLISHED IN AUSTRALIA, INDIA, AND JAPAN

Compiled by Prof. T. Okoshi, Department of Electronic Engineering, University of Tokyo.

The periodicals investigated are: 1) Transactions of the Institute of Electronics and Communication Engineers of Japan (Trans. IECEJ), 2) Journal of the IECEJ, 3) Journal of the Institution of Engineers (J. IE (India)), 4) Proceedings of the Institution of Radio and Electronics Engineers—Monitor (Proc. IREE (Australia)), and 5) Australian Telecommunication Research (ATR).

As for the Japanese papers in the Trans. IECEJ, which carry volume numbers J59B or J59C, single-page English summaries ($\frac{1}{4}$ page for Correspondences) will be found in the "Transactions of IECEJ, Section E" issued in the same month, where "E" denotes English. Papers carrying volume number E59 are papers written originally in English and will be found in Section E. Both the Section J and Section E issues are published from the IECEJ, Kikai-Shinko-Kaikan, 3-5-8 Minato-ku, Tokyo 105, Japan.

This time the 1976 issues of the Journal of the Institution of Electronics and Telecommunication Engineers (J. IETE (India)) were not available in Tokyo.

Field Theory and Electromagnetic Compatibility

1

Unified Approach to the Derivation of Variational Expressions for Electromagnetic Fields, by K. Morishita and N. Kumagai (Faculty of Engineering, Osaka University, Suita-shi, 565 Japan): *Trans. IECEJ*, vol. J59-B, pp. 165–172, March 1976.

So far the variational expressions have been derived intuitively or upon a trial-and-error basis. This paper describes a unified method for deriving it upon the basis of the minimum action principle.

2

Detection of 2 GHz Microwave Power Passing through the Human Body (Correspondence), by I. Yamaura (Electrotechnical Laboratory, Tanashi-shi, 188 Japan): *Trans. IECEJ*, vol. J50-C, pp. 316–317, May 1976.

Attenuation in the human body is measured; the application of microwaves in medical diagnosis in the future is discussed.

Amplifiers and Oscillators

1

Phase-Coherent Degenerate Parametric Amplifier—Large Signal Analysis, by H. Umeda (Faculty of Engineering, Fukui University, Fukui-shi, 910 Japan): *Trans. IECEJ*, vol. J59-B, pp. 83–90, February 1976.

It is shown that as the signal power increases, the frequency response varies from a singly humped to a doubly humped one via the relatively flat response. Conditions for the maximally flat response are derived.

2

Noise Analysis of Mutually but Asymmetrically Synchronized Oscillators (Correspondence), by I. Ohta (Faculty of Engineering, Ehime University, Matsuyama-shi, 790 Japan) and R. Fukui (Faculty of Engineering, Okayama University): *Trans. IECEJ*, vol. E59, pp. 9–10, April 1976.

Theoretical analysis taking into account the effects of nonlinear reactance and modulation noise.

3

Locking Characteristics of Injection-Locking Type TRAPATT Amplifiers, by Y. Ogita, S. Furukawa, and K. Honjo (Faculty of Coordinated Sciences, Tokyo Institute of Technology, Yokohama-shi, 227 Japan): *Trans. IECEJ*, vol. J59-B, pp. 333–340, June 1976.

The TRAPATT amplifier is promising for use in phased-array radars. In this paper the locking characteristics are investigated both theoretically and experimentally. Design examples are given.

4

Study on Injection Locking Phenomena in Microwave Solid-State Oscillator Having Linear Frequency Variation, by K. Honjo, Y. Ogita, and S. Furukawa (Faculty of Coordinated Sciences, Tokyo Institute of Technology, Yokohama-shi, 227 Japan): *Trans. IECEJ*, vol. J59-B, pp. 413–436, August 1976.

The frequency deviation during a pulse is investigated both theoretically and experimentally. In the theory the free-running oscillation frequency is assumed to depend linearly upon external parameters such as temperature.

5

Prospective Applications of GaAs FETs in Analog Communications Equipment at Microwave Frequencies, by R. Horton (Research Dept., Australian Telecommunications Commission): *Monitor* (*Proc. IREE Australia*), vol. 37, no. 11, pp. 326–338, November 1976.

Applications to amplifiers, oscillators, and mixers are discussed; their design based upon experience is explained and exemplified. The limitations of the devices are also outlined.

6

Waveguide Type GaAs FET *K*-Band Amplifier (Correspondence), by H. Tohyama and H. Mizuno (Yokosuka Electrical Communication Laboratory, N.T.T., Yokosuka-shi, 238-03 Japan): *Trans. IECEJ*, vol. J59-B, pp. 543–544, November 1976.

A *K*-band amplifier with $f_0 = 20$ GHz, $BW = 400$ MHz, and $G = 6$ dB has been constructed by using commercially available FET's and a waveguide mount.

7

Stabilization of an IMPATT Oscillator Through Subharmonic Injection Locking to a Parasitic Oscillation (Correspondence), by R. Hayashi (Radio Research Laboratories, Koganei-shi, 184 Japan) and M. Onda (Faculty of Engineering, Chiba Institute of Technology, Narashino-shi, 275 Japan): *Trans. IECEJ*, vol. J59-B, pp. 590–591, December 1976.

A report of an experiment. Locking gains of 30 and 15 dB and bandwidths of 30 and 15 MHz are obtained for one-half and one-quarter subharmonic locking, respectively.

Couplers, Filters, and Resonators

1

A Design of Rectangular Waveguide Band-Pass Filters with Desired Off-Band Characteristics, by K. Yamamoto (Yokosuka Electrical Communication Laboratory, N.T.T., Yokosuka-shi, 238-03 Japan): *Trans. IECEJ*, pp. 41–48, January 1976.

A design method is proposed to realize a frequency response with a prescribed center frequency, bandwidth, and high rejection at an off-band frequency. The validity is demonstrated by experiment.

2

Improvement of Delay Characteristics of Microwave Filters by a Function Minimization Method, by K. Matsumoto and K. Ogusu (Faculty of Engineering, Shizuoka University, Hamamatsu-shi, 432 Japan): *Trans. IECEJ*, vol. J59-B, pp. 49–54, January 1976.

A design method is proposed to minimize the delay distortion in the passband satisfying the given specifications on the amplitude response. Validity of the theory is proved by experiment.

3

30-GHz-Band Periodic Filter with a Ring-Type Resonator, by H. Kumazawa, I. Ohtomo, and S. Shimada (Yokosuka Electrical Communication Laboratory, N.T.T., Yokosuka-shi, 238-03 Japan): *Trans. IECEJ*, vol. J59-B, pp. 55–62, January 1976.

A periodic filter consisting of a ring resonator and three directional couplers is proposed and experimented with. An example of the characteristics is as follows: $f_0 = 30$ GHz, bandwidth $= 1$ GHz, loss $= 0.26$ dB, the off-band attenuation being equal to that of a $6 \sim 7$-stage maximally flat type filter.

4

External Q of a TE_{01}° Dielectric Resonator Used in Waveguide Bandpass Filter, by Y. Konishi (NHK Technical Research Laboratories, Tokyo, 157 Japan): *Trans. IECEJ*, vol. E59, pp. 13–18, January 1976.

The external Q of the resonator is computed from the stored energy in and the reradiation from the dielectric cylinder.

5

Slot-Type Planar Circuit Mounted in Waveguide, by S. Ohkawa, M. Suzuki, and Y. Yamagishi (Faculty of Engineering, Hokkaido University, Sapporo-shi, 060 Japan): *Trans. IECEJ*, vol. J59-B, pp. 173–180, March 1976.

Equivalent circuit parameters of slots in PCMW (planar circuit mounted in waveguide; proposed by Y. Konishi) are derived theoretically. Design formulas are given and verified experimentally.

6

Mixed-Type Wide-Band Circular-Arc-Polygonal TE_{on}-Mode Filter, by K. Inada, T. Akimoto, and T. Hayakawa (Fujikura Cable Works, Tokyo, 135 Japan): *Trans. IECEJ*, vol. J59-B, pp. 365–372, July 1976.

An experiment combining many mode filters for rejecting different circular TE_{on}-modes is described. The achieved attenuations for TE_{02} and TE_{03} are higher than 10 dB whereas for TE_{01} it is below 0.25 dB.

7

Effect of Mismatch in Impedances and Difference in Phase Velocities for Microstrip Line Directional Coupler, by Banmali (Himalayan Radio Propagation Unit, Dehra Dun, India): *J.IE.*, pt. ET (India), vol. 57, pp. 19–21, August 1976.

Effects of impedance mismatches due to the presence of inhomogeneous dielectric materials are analyzed.

8

Design and Development of X-Band Band-Pass Filter in Strip-Line Configuration, by P. C. Dhar (Thapar College of Engineering, Patiala, India) and B. Bhat (IIT, Delhi, India): *J. IE.*, pt. ET (India), vol. 57, pp. 15–18, August 1976.

Report of a six-stage stripline Tchebyscheff filter with a passband of 9.2–10 GHz with loss below 0.5 dB and 38-dB attenuation at 8.55 GHz and 37-dB attenuation at 10.45 GHz.

9

80-GHz Band Two-Cavity Ring-Type Channel-Dropping Filter with a Semi-Circular Waveguide, by N. Nakajima and I. Ohtomo (Yokosuka Electrical Communication Laboratory, N.T.T., Yokosuka-shi, 238-03 Japan): *Trans. IECEJ*, vol. J59-B, pp. 489–496, October 1976.

The use of the semicircular waveguide in the channel dropping filter is proposed. By this new scheme the insertion loss is reduced by one half as compared with the conventional type using rectangular guides.

10

Computer-Aided Design of Microstrip Interdigital Quadrature Couplers, by J. W. Archer (EE Department, Sydney University): *Monitor* (*Proc. IREE Anst.*), vol. 37, no. 10, pp. 301-305, October 1976.

Design procedure is presented for the interdigital quadrature couplers proposed by J. Lange and discussed theoretically by W. P. Ou. The validity of the design procedure is also shown experimentally.

11

20-GHz Band Cylindrical Diplexer Made of Thin-Walled Waveguides and Cavities (Correspondence), by N. Nakajima (Yokosuka Electrical Communication Laboratory, N.T.T., Yokosuka-shi, 238 Japan) and T. Nunotani (Shimada Physical and Chemical Industrial Co., Ltd., Chofu-shi, 182 Japan): *Trans. IECEJ*, vol. J59-B, pp. 587–588, December 1976.

A light-weight diplexer (75 g) has been developed for use in satellites. Branching and insertion losses are 0.48 and 0.10 dB, respectively.

12

Resonance Field of a Cylindrical Rod Inserted into a Rectangular Waveguide (Correspondence), by T. Yoshida and M. Umeno (Faculty of Engineering, Nagoya University, Nagoya-shi, 464 Japan): *Trans. IECEJ*, vol. J59-B, pp. 589–590, December 1976.

A formula is derived which gives the resonance frequency of the structure.

Ferrite Devices and Circuits

1

One-Junction-Type Isolator Widebanding Method (Correspondence), by K. Ikuta (Musashino Electrical Communication Laboratory, N.T.T., Musahino-shi, 180 Japan): *Trans. IECEJ*, vol. J59-B, pp. 73–76, January 1976.

A simple widebanding scheme for an isolator consisting of a three-port circulator and a matched termination is proposed. A relative bandwidth of 15 percent is obtained at 60 GHz.

2

Magnetostatic Surface-Wave Propagation through the Air Gap between Adjacent Magnetic Substrates (Correspondence), by M. Tsutsumi and N. Kumagai (Faculty of Engineering, Osaka University, Suita-shi, 565 Japan): *Trans. IECEJ*, vol. J59-B, pp. 143–144, February 1976.

An experiment on the surface wave between YIG slabs is described, and the obtained dispersion curves are compared with theory.

3

Calculation of Amplification Factor of Magnetostatic Wave (Correspondence), by I. Awai, J. Ikenoue (Faculty of Engineering, Kyoto University, Kyoto-shi, 606 Japan), and H. Shimazu (Nippon Electric Co., Yokohama-shi, 226 Japan): *Trans. IECEJ*, vol. J59-B, pp. 216–218, March 1976.

Theoretical analyses of a two-layer structure consisting of magnetic and semiconductor materials. Amplification factor is computed.

4

Attenuation and Pass-Band of Three-Port Y-Junction Circulator, by B. R. Vishvakarma (MNR Engineering College, Allahabad, India) and K. K. Jha (Banaras Hindu University, India): *J. IE.*, pt. ET (India), vol. 56, pp. 133–135, April 1976.

A theoretical analysis. Design formulas are given.

5

Resonator Model of Y-Junction Circulator, by B. R. Vishvakarma (MNR Engineering College, Allahabad, India) and K. K. Jha (Banaras Hindu University, India): *J. IE.*, pt. ET (India), vol. 56, pp. 130–132, April 1976.

A model called a resonator model is proposed to give a comprehensive physical picture of the operation of a Y-junction circulator.

6

New Edge-Guided Mode Devices, by J. Araki and Y. Naito (Tokyo Institute of Technology, Tokyo, 152 Japan): *Trans. IECEJ*, vol. E59, pp. 1–8, April 1976.

A new-type edge-guided mode isolator is proposed and experimented with. Design theory is also given. The new structure features 1) a high forward-to-reverse ratio, 2) simple construction, and 3) a bandwidth up to 40 percent. Application of the same principle to the circulator is also discussed.

7

Formulation of Frequency Dispersion of Ferrite Permeability, by Y. Naito (Faculty of Engineering, Tokyo Institute of Technology, Tokyo, 152 Japan): *Trans. IECEJ*, vol. J59-C, pp. 297–304, May 1976.

A simple formula expressing the frequency dependence in a wide frequency range is obtained. The principle of the derivation and the physical implications are discussed.

8

A Study on the Modes of Waves Propagating Through the Circular Waveguide Containing a Ferrite Toroid, by S. Ohkawa, K. Yashiro, and H. Yamamoto (Faculty of Engineering, Chiba University, Chiba-shi, 280 Japan): *Trans. IECEJ*, vol. J59-B, pp. 457–463, September 1976.

Rigorous solutions are obtained for axially symmetrical modes. For hybrid modes, a numerical approach is proposed and the solutions are given.

Microwave Acoustic Devices

1

Numerical Analysis of an Elastic Wave-Guide with Rectangular Cross Section by the Modal Expansion Method, by T. Miyamoto (Faculty of Engineering, Fukuoka University, Fukuoka-shi, 814 Japan) and K. Yasuura (Faculty of Engineering, Kyushu University, Fukuoka-shi, 812 Japan): *Trans. IECEJ*, vol. J59-B, pp. 91–98, February 1976.

The use of the modal expansion method features preciseness in numerical computation and easiness in error estimation. Dispersion curves are obtained and compared with conventional analyses.

2

Reflection and Transmission of Acoustic Surface Waves at Periodic Arrays of Grooves (Correspondence), by S. Sato and T. Makimoto (Faculty of Engineering Science, Osaka University, Toyonaka-shi, 560 Japan): *Trans. IECEJ*, vol. J59-B, pp. 213–215, March 1976.

Theoretical analysis. Design charts for various materials are given.

3

Periodic Coupling between Piezoelectric and Magnetoelastic Surface Waves, by K. Kishimoto, M. Tsutsumi, and N. Kumagai (Faculty of Engineering, Osaka University, Suita-shi, 565 Japan): *Trans. IECEJ*, vol. J59-B, pp. 231–237, April 1976.

Propagation constants and the coupling coefficient are computed, and the effect of the nonuniformity in the magnetization on the coupling is investigated.

4

Integral Representations of Shear Horizontal Magnetoelastic Waves, by Z. Kawasaki (Faculty of Engineering, Osaka University, Suita-shi, 565 Japan) and K. Tanaka (Faculty of Engineering, Gifu University, Kagamihara-shi, 504 Japan): *Trans. IECEJ*, vol. J59-B, pp. 357–364, July 1976.

The integral representation is derived first. In the latter half of this paper, it is applied to the analysis of a corner of obtuse angle.

5

Acoustic Wave Propagation in Anisotropic Rods Rectangular Cross Section, by M. Koshiba and M. Suzuki (Faculty of Engineering, Hokkaido University, Sapporo-shi, 060 Japan): *Trans. IECEJ*, vol. J59-B, pp. 513–520, November 1976.

The finite-element method and an equivalent circuit approach are used successfully in the analysis of the propagation characteristics.

Transmission Lines, Waveguides

1

A Comparison of the Channel Guide and Trough Guide Concerning the Phase Constants (Correspondence), by T. Kaneki (NHK Technical Research Laboratories, Tokyo, 157 Japan): *Trans. IECEJ*, vol. J59-B, pp. 211–213, March 1976.

Phase constants are computed precisely for the two structures for application of these to surface-wave antennas.

2

Characteristic Impedance of Slot Line (Correspondence), by Yukinari Hayashi and Yoshio Hayashi (Kitami Institute of Technology, Kitami-shi, 090 Japan): *Trans. IECEJ*, vol. J59-B, pp. 215–216, March 1976.

A simple formula taking the conductor thickness into account is derived.

3

Circular Corner Waveguides for a Millimeter-Wave Communication System (Correspondence), by T. Itanami and K. Hashimoto (Yokosuka Electrical Communication Laboratory, N.T.T., Yokosuka-shi, 238-03, Japan): *Trans. IECEJ*, vol. J59-B, pp. 294–295, May 1976.

Experimental data of the corners (mirror-type bends) in the circular TE_{01} waveguide are shown and discussed.

4

An Equivalent Circuit of Rectangular Waveguide Mounting Two-Diodes (Correspondence), by S. Toyota (Osaka Institute of Technology, Osaka-shi, 535 Japan): *Trans. IECEJ*, vol. J59-B, pp. 297–298, May 1976.

Equivalent circuit parameters are derived for a structure in which two diodes are mounted in a plane normal to the waveguide axis.

Optical Fibers

1

Optical Mode Propagation and Scattering in Randomly Inhomogeneous Gradient Fibers with Irregular Bends, by Y. Miyazaki (Faculty of Engineering, Nagoya University, Nagoya-shi, 464 Japan): *Trans. IECEJ*, vol. J59-C, pp. 37–44, January 1976.

Mode conversion and scattering in focusing-type gradient-index fibers, with a randomly fluctuating index distribution and bending, are computed. The transmission loss due to the scattering is estimated.

2

Frequency Response of Multimode *W*-type Optical Fibers (Correspondence), by T. Tanaka, S. Onoda, and M. Sumi (Central Research Laboratory, Hitachi Ltd., Kokubunji-shi, 185 Japan): *Trans. IECEJ*, vol. J59-C, pp. 91–98, February 1976.

The relation between the baseband frequency response and the impulse response of multimode *W*-type optical fibers is investigated theoretically and experimentally, showing good agreement.

3

Transmission Bandwidth and Pulse-Transmission Characteristics of Multimode *W*-type Optical Fibers, by T. Tanaka, S. Onda, and M. Sumi (Central Research Laboratory, Hitachi Ltd., Kokubunji-shi, 185 Japan): *Trans. IECEJ*, vol. J59-C, pp. 138–139, February 1976.

A *W*-type optical fiber consists of a uniform core, uniform cladding, and an intermediate layer between them having a refractive index lower than that of the cladding. In this paper, the frequency response of multimode *W*-type fibers is investigated theoretically and experimentally.

4

Relation between Refractive Index Difference and Transmission Bandwidth of Multimode *W*-type Optical Fiber (Correspondence), by T. Tanaka, S. Onoda, M. Sumi, and T. Suganuma (Central Research Laboratory, Hitachi Ltd., Kokubunji-shi, 185 Japan): *Trans. IECEJ*, vol. J59-C, pp. 178–180, March 1976.

The relation in the title is investigated both theoretically and experimentally. Theory and experiment show good agreement.

5

Measurement of Optical Fiber Transfer Functions Based Upon the Swept-Frequency Technique for Baseband Signals (Correspondence), by I. Kobayashi and M. Koyama (The Yokosuka Electrical Communication Laboratory, N.T.T., Yokosuka, 238 Japan): *Trans. IECEJ*, vol. E59, pp. 11–12, April 1976.

The measurement system and some of the results are described. Signal-to-noise ratio and frequency resolution are discussed in comparison with the pulse method.

6

Quantitative Mode Analysis in Optical Fiber (Correspondence), by T. Hirashima (Dainichi Nippon Cables, Ltd., Itami-shi, 663 Japan), H. Shigesawa and K. Takiyama (Faculty of Engineering, Doshisha University, Kyoto-shi, 602 Japan): *Trans. IECEJ*, vol. J59-C, pp. 258–260, April 1976.

A method of the mode analysis is proposed in which the amplitudes of the modes are computed from the far-field projection pattern at the fiber exit.

7

Some Aspects of Transfer Function of Fibers (Correspondence), by Y. Kawamura (Fujitsu Laboratories, Kawasaki-shi, 211 Japan): *Trans. IECEJ*, vol. J59-C, pp. 323–326, May 1976.

Multimode dispersion in α-power graded-core fibers is computed, taking into account the increasing loss in higher modes.

8

A Theoretical Study of Helical Bends of Parabolic Index Optical Fibers Based on Geometrical Optics, by S. Sawa (Faculty of Engineering, Ehime University, Matsuyama-shi, 790 Japan): *Trans. IECEJ*, vol. J59-B, pp. 449–456, September 1976.

In optical fiber cables, individual fibers are subject to periodical, helical bends. In this paper the radiation phenomena and the optimum launching conditions for such fibers are investigated.

9

Band-Widening of Multimode Optical Fibers by Means of Mode Converters, by S. Kurazono (Faculty of Engineering, Osaka University, Suita-shi, 565 Japan): *Trans. IECEJ*, vol. J59-C, pp. 547–552, September 1976.

Several types of mode converters for reducing the multimode dispersion are proposed. The common principle is to convert high-velocity modes to low-velocity ones and vice versa. It is estimated that the simplest type may reduce the dispersion by one fourth.

10

Pulse Propagation in Multimode Fibers, by T. Egashira and H. Nagashima (Department of Electronics, Kogakuin University, Tokyo 160 Japan): *Trans. IECEJ*, vol. J59-C, pp. 620–627, October 1976.

The waveform distortion and widening of an optical pulse transmitted in a multimode fiber having randomly distributed inter-mode coupling are investigated theoretically.

11

A Trial Interpretation on Mode Mixing of Fiber by Diffraction Theory (Correspondence), by Y. Kawamura (Fujitsu Laboratories, Kawasaki-shi, 211 Japan): *Trans. IECEJ*, vol. J59-C, pp. 678–679.

Formulas giving mode conversion and scattering loss in an axially fluctuating fiber are derived. Numerical examples are given.

12

An Exact Analysis of Cylindrical Fiber with Index Distribution by Matrix Method and Its Application to Focusing Fiber, by T. Tanaka and Y. Suematsu (Department of Physical Electronics, Tokyo Institute of Technology, Tokyo, 152 Japan): *Trans. IECEJ*, vol. E59, pp. 1–8, November 1976.

A method of rigorous vectorial wave analysis based upon the stratified-layer model is proposed and computations are performed. The relation between the vectorial wave and approximate scalar wave analyses is discussed.

13

Analysis of Fiber Scattering Loss by Lossy Layer Model, by Y. Kawamura, E. Miyauchi, and K. Miyazaki (Fujitsu Laboratories, Kawasaki-shi, 211 Japan): *Trans. IECEJ*, vol. J59-C, pp. 701–708, November 1976.

A new model, named "lossy layer model," is used in the analysis of the scattering loss. The results of the analysis based upon the ray theory and this new model show good agreement with experimental data.

14

Dispersion and Bending Loss of Fibers, by Y. Kawamura (Fujitsu Laboratories, Kawasaki-shi, 211 Japan): *Trans. IECEJ*, vol. J59-C, pp. 709–714, November 1976.

Dispersion and bending loss in optical fibers are investigated experimentally. The loss due to the microbending is proportional to Δ^3, where Δ denotes the relative index difference between the core and cladding.

15

A Proposal for Measuring Material Dispersion of Optical Fibers (Correspondence), by M. Koyama and I. Kobayashi (Yokosuka Electrical Communication Laboratory, N.T.T., Yokosuka-shi, 238-03 Japan): *Trans. IECEJ*, vol. J59-C, pp. 817–818, December 1976.

A new precise measurement technique is proposed, which uses two lasers amplitude-modulated by a common sinusoidal wave.

Optical Waveguides Other Than Fibers (Slab Type, Lenses, etc.)

1

Optical Second Harmonic Generation Due to Five-Layer Thin Film Waveguide with an Anisotropic Layer (Correspondence), by T. Tanaka, S. Kurazono, and K. Itakura (Faculty of Engineering, Osaka University, Suita-shi, 565 Japan): *Trans. IECEJ*, vol. J59-C, pp. 63–64, January 1976.

Harmonic generation in a thin film is advantageous because power concentration can be expected. Theory and numerical analysis.

2

Normal-Mode Analysis of Semi-Leaky Type Anisotropic Thin-Film Optical Waveguides and Their Application to Thin-Film Mode Filters, by Y. Okamura, S. Yamamoto, T. Makimoto (Faculty of Engineering Science, Osaka University, Toyonaka-shi, 560 Japan): *Trans. IECEJ*, vol. J59-C, pp. 201–208, April 1976.

The "semi-leaky type waveguide" means a structure in which one of the TE and TM modes is propagating but the other is leaky. This paper describes the theoretical analysis and experiment of its application to mode filters.

3

TE–TM Mode Conversion by Acousto-Optic Interaction in Metal Diffused Optical Waveguide, by K. Yamanouchi, K. Shibayama, and K. Higuchi (Research Institute of Electrical Communication, Tohoku University, Sendai-shi, 980 Japan): *Trans. IECEJ*, vol. J59-C, pp. 355–362, June 1976.

Numerical integration and the WKB method are used to analyze the phenomenon. It is shown for example that an acoustic power of 38 mW is required to obtain 100-percent conversion when the interaction length is 5 mm and the beam width is 1 mm.

4

A Numerical Analysis of Optical Guides with Polygonal Boundaries, by T. S. Bird (Dept. of EE, University of Melbourne, Parkville, Victoria, Australia): *Monitor* (*Proc. IREE Aust.*), vol. 37, no. 7, pp. 235–241, July 1976.

A new method of analysis, called the "hybrid-finite element method," developed by the author, has been applied to the problem. The results show good agreement with known solutions for the regular polygonal, rectangular, and triangular optical guides. Results for the overlay guide, which is suitable for integrated optical circuits, are also presented.

5

Theory of the Optical Stripline and its Numerical Analysis, by A. Ihaya, H. Furuta, and H. Honda (Fujitsu Laboratories Ltd., Kawasaki-shi, 211 Japan): *Trans. IECEJ*, vol. 59-C, pp. 561–568, September 1976.

The optical stripline is a light waveguide proposed by the same authors (1973 CLEA). This paper describes a rigorous theoretical analysis of its dispersion characteristics and power distribution. The accuracy of the simpler theory based upon the "equivalent refractive index" is elucidated.

6

Optical Modes in Dielectric Thin Film Fiber with Convex Surface—by Conformal Mapping Technique, by Y. Miyazaki (Faculty of Engineering, Nagoya University, 464 Japan): *Trans. IECEJ*, vol. E59, pp. 1–5, October 1976.

A single material low-loss optical waveguide can be made by the structure described in the title. In this paper the dispersion characteristics are investigated by using the conformal mapping technique. Numerical examples are given.

7

A Theoretical Study of Propagation Behavior of Light Beams Along Periodic Optical Waveguides Consisting of Lens-Like Media with Complex Permittivity (Correspondence), by S. Sawa, K. Ono, and H. Ogasa (Faculty of Engineering, Ehime University, Matsuyama-shi, 790 Japan): *Trans. IECEJ*, vol. J59-B, pp. 508–509, October 1976.

Conditions for stable beam propagation are investigated taking the effect of loss in the media into account.

8

Removal of the Degeneracy in Modes of Lens-Like Medium by an x^2y^2 term in the Index Distribution, by K. Iga, Y. Kokubun, and K. Yokomori (Laboratory of Precision Machinery and Electronics, Tokyo Institute of Technology, Yokohama-shi, 227 Japan): *Trans. IECEJ*, vol. J59-C, pp. 670–677, October 1976.

The degeneration, propagation constant, and group delay of Elmite–Gaussian modes are investigated theoretically.

9

Propagation Losses in Diffused Optical Waveguides with Metal Cladding (Correspondence), by Y. Ando, M. Masuda, and J. Koyama (Faculty of Engineering, Osaka University, Suita-shi, 565 Japan): *Trans. IECEJ*, vol. J59-C, pp. 679–681, October 1976.

Analyses are performed for refractive index distributions of complementary-error-function type and of Gaussian type. Numerical examples are given.

10

Delay Equalization Characteristics of a Periodic Dielectric Structure for Optical Transmission, by K. Kusano, S. Kawakami, and S. Nishida (Research Institute of Electrical Communication, Tohoku University, Sendai-shi, 980 Japan): *Trans. IECEJ*, vol. J59-C, pp. 730–737, November 1976.

A periodic structure in an optical waveguide may be used as a delay equalizer. The delay characteristics of this structure are analyzed by using the coupled-mode theory.

Measurement

1

Discussions on Dielectric Resonator Methods of Measuring Complex Dielectric Constants, by Y. Kobayashi and S. Tanaka (Faculty of Science and Engineering, Saitama University, Urawa-shi, 338 Japan): *Trans. IECEJ*, vol. J59-B, pp. 223–230, April 1976.

High-precision measurement of the dielectric constant using a precisely machined cylindrical sample sandwiched between two conducting plates is investigated both theoretically and experimentally.

2

The Measurement Method of Spurious Modes in Millimeter Waveguides Using Spurious Mode Standard Generators, by H. Murata (Ibaragi Electrical Communication Laboratory, N.T.T., Tokai, 319-11 Japan): *Trans. IECEJ*, vol. J59-B, pp. 525–543, November 1976.

Two types of standard spurious mode generators have been devised and used successfully in the measurement of spurious modes. High accuracy (for example, below 3 dB for -40-dB spurious mode level) has been achieved by the use of this standard.

Microwave and Optical Systems

1

Optical-Transmission Experiment at 400 Mb/s Using a Single-Mode Fiber (Correspondence), by T. Ito and S. Machida (Musashino Electrical Communication Laboratory, N.T.T., Musashino-shi, 180 Japan): *Trans. IECEJ*, vol. E59-B, pp. 19–20, January 1976.

An experiment is described in which a 400-Mbit optical signal is transmitted via a 5.9-km single-mode fiber. A receiving power of -38 dBm was needed to achieve 10^{-9} error rate.

2

Test Results of Experimental Microwave On-Board Switching System, by Y. Ito, M. Kyogoku, and M. Yamaguchi (Research and Development Laboratories, Kokusai Denshin Denwa Co., Tokyo, 153 Japan): *Trans. IECEJ*, pp. 122–129, February 1976.

A 4-GHz 8×8 SDMA (space-division multiplex) switching system to be used in communication satellites has been developed. The design concept and measured characteristics are described.

3

Improvement of the Pulse Transmission Characteristics of a Dielectric Optical Waveguide by Using Chirp Pulse, by T. Suzuki and T. Fukumoto (Faculty of Engineering, Osaka University, Suita-shi, 565 Japan): *Trans. IECEJ*, vol. J59-C, pp. 155–162, March 1976.

The "chirp pulse" scheme is applied to the single-mode optical fiber transmission system. Improvement of the dispersion characteristics is investigated theoretically on the slab model.