Overseas Abstracts

Papers from Journals Published in Australia, India, and Japan

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

The periodicals investigated are 1) Transactions of the Institute of Electronics and Communication Engineers of Japan (Trans. IECEJ), 2) Journal of the IECEJ, 3) Journals of the Institution of Engineers (India), Electronics and Telecommunication Engineering Division (Part ET), 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 J61B or J61C, single-page English summaries (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 E61 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.

Amplifiers and Oscillators

1

A Study on Frequency Variation in TRAPATT Pulse Oscillators, by Y. Ogita and S. Furukawa (Tokyo Institute of Technology, Yokohama-shi, 227 Japan): *Trans. IECEJ*, vol. E61, pp. 73–79, February 1979.

The generation mechanism of, and method for suppressing the frequency fluctuation during a pulse is investigated.

2

A Microwave Matched-Type Transistor Amplifier, by K. Morita (Yokosuka Electrical Communication Laboratory, N. T. T., Yokosuka-shi, 238-03 Japan): *Trans. IECEJ*, vol. J61-B, pp. 196–203, March 1978.

A new-type of impedance-matched transistor amplifier using bridge-T bandpass filters is proposed and experimented with. A four-stage amplifier with $f_c = 1.7$ GHz, $G = 56$ dB, and $BW = 400$ MHz is described.

3

Suppression of Unwanted-Modes in an MIC Stabilized Oscillator by Coupling a Low-Q Cavity, by S. Nanbu (Research Laboratory, Matsushita Electronics Corporation, Takatsuki-shi, 569 Japan): *Trans. IECEJ*, vol. J61-B, pp. 250–257, April 1978.

The same author has proposed an oscillator-frequency stabilization scheme by adding secondary high-Q cavity to a MIC-type oscillator. This paper describes its further improvement; tertially low-Q cavity is added to suppress jumping to spurious modes. An experiment with an IMPATT oscillator is described.

4

Circuit Theory of the Parametric Injection Locking of an IMPATT Diode Oscillator, by H. Okamoto (Musashino Electrical Communication Laboratory, N. T. T., Musashino-shi, 180 Japan): *Trans. IECEJ*, vol. J61-B, pp. 273–280, April 1978.

The parametric injection locking is a frequency-stabilization/noise-reduction scheme for IMPATT oscillators devised and reported by the same author (*Trans. IECEJ*, vol. J60-C, pp. 219–226, May 1977). In this paper the theoretical analysis of this scheme is presented.

5

Circuit Conditions for the Complete Power Combination of a Multi-Oscillator System, by T. Makino, M. Nakajima, and J. Ikenoue, (Faculty of Engineering, Kyoto University, Kyoto-shi, 606 Japan): *Trans. IECEJ*, vol. J61-B, pp. 313–320, May 1978.

A general condition for realizing a complete power combination (addition without loss) of many oscillators is derived. The condition is presented in a scattering-matrix form to facilitate application to microwave oscillators which are of practical interest. Locking phenomena are also discussed.

6

Transmission Characteristics of Millimeter-Wave IMPATT Negative-Resistance Amplifiers, by K. Kaneko and H. Kato (Yokosuka Electrical Communication Laboratory, N. T. T., Yokosuka-shi, 238-03 Japan): *Trans. IECEJ*, vol. J61-B, pp. 375–382, May 1978.

The waveform-distortion characteristics of IMPATT amplifiers for four-phase phase-shift keying (PSK) signals are investigated both theoretically and experimentally. The error-rate characteristics are also discussed.

7

The Measurement of the IMPATT Diode's Admittance Under the Effect of Second-Harmonic Frequency, by Y. Shindo and S. Okamura (Faculty of Engineering, University of Tokyo, 113 Japan): *Trans. IECEJ*, vol. J61-B, pp. 398–404, May 1978.

The large-signal admittance of a IMPATT diode is measured by using the "injection-locking method" at 10 GHz. The effect of the presence of the second harmonic (20 GHz) with various levels and the relative phase with respect to the fundamental signal is investigated.

8

Highly Stabilized 11 GHz Gunn Oscillator (Correspondence), by M. Nakata, K. Ogiso, D. Taketomi, and I. Machida (Mitsubishi Electric Corporation, Kamakura-shi, 247 Japan): *Trans. IECEJ*, vol. J61-B, pp. 544–546, June 1978.

Frequency stability of 10^{-6}/degree has been achieved by the temperature-compensation scheme using two different dielectric rods.

9

Method of Determining Equivalent Circuit Constants of Packaged IMPATT Diode (Correspondence), by I. Suemune and T. Kawano (Faculty of Engineering, Hiroshima University, Hiroshima-shi, 730 Japan): *Trans. IECEJ*, vol. E61, pp. 633–634, August 1978.

A new method is proposed and experimented with. Data are processed by a computer to determine the F-matrix of the circuit between the input end and diode.

10

86 GHz DDR IMPATT Negative Resistance Amplifier (Correspondence), by K. Kaneko and N. Kammuri (Yokosuka Electrical Communication Laboratory, N. T. T., Yokosuka-shi, 238-03 Japan), M. Ando and I. Haga (Nippon Electric Company, Ltd.): *Trans. IECEJ*, vol. J61-B, pp. 913–915, October 1978.

A report of development. A negative-resistance amplifier delivering 18 dBm with an 8-dBm input has been obtained at 86 GHz. The 1-dB bandwidth is 1.5 GHz.

11

Oscillation Characteristics of Read-Type IMPATT Diode Under Large-Signal Conditions (Correspondence), by M. Fukushima (Computing Center, Hiroshima University, Hiroshima-shi, 730 Japan), and T. Kawano (Faculty of Engineering, Hiroshima University): *Trans. IECEJ*, vol. J61-B, pp. 975–977, November 1978.

The oscillation characteristics are calculated by using the large-signal admittance formula and the equivalent circuit of the waveguide structure.

12

A Study on Injection-Locking and Negative-Resistance Amplifiers, by T. Hayasaka and K. Sakamoto (Nippon Electric Company, Ltd., Yokohama-shi, 226 Japan): *Trans. IECEJ*, vol. J61-B, pp. 1001–1007, December 1978.

Large-signal characteristics of the two types of microwave amplifier are calculated and compared. The results are also compared with experiment, showing good agreement.

Modulators, Converters, Detectors, and Phase Shifters

1

Noise-Temperature Measurement of a 100-GHz Second-Harmonic Mixer (Correspondence), by R. Kawasaki (Yokosuka Electrical Communication Laboratory, N. T. T., Yokosuka-shi, 238 Japan): *Trans. IECEJ*, vol. J61-B, pp. 72–73, January 1978.

Measured noise temperature is shown in terms of the bias voltage and local oscillator power. The minimum NF is 15 dB.

2

A Broad Band Microwave Variable Equalizer, by K. Yamada (Musashino Electrical Communication Laboratory, N. T. T., Musashino-shi, 180 Japan): *Trans. IECEJ*, vol. J61-B, pp. 235–241, April 1978.

In modern high-speed digital communication systems, a variable-delay equalizer capable of correcting a delay having any frequency dependence is desirable for maximizing the channel capacity. A new model has been developed for use in 800 Mbit/s four-phase PSK system with $f_c = 1.7$ GHz. The residual delay is 0.25 dB (p – p).

3

A Quasi-Optical Detector for 100–300 GHz (Correspondence), by R. Kawasaki and K. Yamamoto (Yokosuka Electrical Communication Laboratory, N. T. T., Yokosuka-shi, 238-03 Japan): *Trans. IECEJ*, vol. J61-B, pp. 416–418, May 1978.

An open-type detector using the lead-wire (whisker) of a honeycomb diode as an antenna has been developed.

4

An Analysis of Millimeter-Wave Frequency Doublers Using Schottky-Barrier Diodes, by R. Kawasaki (Yokosuka Electrical Communication Laboratory, N. T. T., Yokosuka-shi, 238-03 Japan): *Trans IECEJ*, vol. J61-B, pp. 608–615, July 1978.

The nonlinear differential equation in terms of voltage and current is solved in the time domain, and the harmonic generation is analyzed by the Fourier analysis of the waveforms. Frequency-doubling efficiency is given in terms of input power, bias voltage, and circuit parameters.

5

Millimeterwave Channel Diplexer Using Gaussian Beam Mode, by N. Nakajima (Yokosuka Electrical Communication Laboratory, N. T. T., Yokosuka-shi, 238-03 Japan): *Trans. IECEJ*, vol. J61-B, pp. 796–803, September 1978.

An 100-GHz channel diplexer (dropping filter) has been constructed. It consists of three dielectric antennas for coupling the waveguides and the Gaussian beam, two ring resonators, and two parabolic mirrors. The dropping loss and insertion loss are 0.5 dB and 0.2 dB, respectively, which are comparable to those obtained with waveguide-type diplexers.

6

A Method for the Design of Circuit Polarizer Using Waveguide Partially Filled with Conducting Wedge, by T. Kaneki and H. Matsumura (Technical Research Laboratories, NHK, Tokyo, 157 Japan): *Trans. IECEJ*, vol. J61-B, pp. 1014–1020, December 1978.

A new structure as described in the title is proposed, and the design theory is presented. The design theory is applied to a 7-GHz polarizer successfully.

Couplers, Filters, Resonators and Planar Circuits

1

Helical Filter Having Single Passband (Correspondence), by T. Sugiura, N. Inoue, and M. Hiramatsu (Maspro Corporation, Aichi-Ken, 740-01 Japan): *Trans. IECEJ*, vol. J61-B, pp. 75–76, January 1978.

Using the coupling between higher order modes of several helix elements having different pitch, a filter having a single passband can be made. An experiment at 600 MHz is described.

2

Multi-Divided Type TE_{0n} Mode Filter, by S. Seikai and Y. Tamura (Ibaraki Electrical Communication Laboratory, N. T. T., Ibaraki-ken, 319-11 Japan): *Trans. IECEJ*, vol. J61-B, pp. 174–181, March 1978.

A novel type of the TE_{0n} mode filter (passing $n = 1$ and rejecting $n > 1$) for circular waveguides is proposed and experimented with. In the proposed structure the waveguide is divided into fan-shaped sectors having different propagation constants.

3

High Power Channel Multiplexing Filters at Millimeter Wavelengths (Correspondence), by T. Itanami (Yokosuka Electrical Communication Laboratory, N. T. T., Yokosuka-shi, 238-03 Japan): *Trans. IECEJ*, vol. J61-B, pp. 207–208, March 1978.

Multiplexing filters for use in high-power transmitting ground stations for satellite communication have been developed.

4

A Direct Stripline-to-Waveguide Transition and its Application to an MIC Stabilized Oscillator, by S. Nanbu (Research Laboratory, Matsushita Electronics Corporation, Takatsuki-shi, 569 Japan): *Trans. IECEJ*, vol. J61-B, pp. 258–264, April 1978.

A new type of stripline-waveguide coupler has been developed, which consists of a short-circuited rectangular waveguide section and dipole antenna formed on an aluminum substrate. Over a frequency range 10.3±0.7 GHz, VSWR < 1.2 and insertion loss < 0.2 dB.

5

100 GHz-Band Channel Diplexer Using Fabry–Perot Resonator (Correspondence), by R. Watanabe and N. Nakajima (Yokosuka Electrical Communication Laboratory, N. T. T., Yokosuka-shi, 238-03 Japan): *Trans. IECEJ*, vol. J61-B, pp. 305–306, April 1978.

A new type of diplexer consisting of two circular-polarization generators and a Fabry–Perot resonator is proposed and experimented with. Diplexing loss of 0.8 dB and insertion loss of 0.6 dB are obtained.

6

The Analysis of Spiral Line, by T. Sasaki and S. Oonuma (Faculty of Engineering, Tohoku Gakuin University, Tagajyo-shi, 985 Japan), R. Sato (Faculty of Engineering, Tohoku University), and K. Nagai (Faculty of Engineering, Tohoku Gakuin University): *Trans. IECEJ*, vol. J61-B, pp. 351–358, May 1978.

A spiral line used in microwave-integrated circuits is analyzed by approximating it as an ensemble of ring-shaped conductors. The equivalent circuit is derived and the circuit parameters are shown for some examples. The theory shows good agreement with experiment.

7

A Class of Maximally-Flat Waveguide Bandpass Filter Consisting of Array of Dielectric Slabs (Correspondence), by S. Kuwano and K. Kokubun (College of Engineering, Nihon University, Koriyama-shi, 963 Japan): *Trans. IECEJ*, vol. J61-B, pp. 543–544, June 1978.

Two kinds of high-dielectric-constant low-loss dielectric plates are laminated and used, instead of irises in waveguide filters to form a maximally-flat bandpass filter. Experiment at 10 GHz is described, showing good agreement with theory.

8

Waveguide Variable Bandpass Filters Using Ridge Resonant Irises (Correspondence), by M. Ozasa (Department of EE, Ritsumeikan University, Kyoto-shi, 603 Japan), and S. Toyota (Osaka Institute of Technology, Osaka-shi, 535 Japan): *Trans. IECEJ*, vol. J56-B, pp. 546–547, June 1978.

Ridge-shaped resonant irises are placed with quarter-wavelength spacing. An experiment at 10 GHz is described. The bandwidth varies from 0.6 through 2.2 GHz by varying the shape of the iris.

9

Analysis of Planar Circuit with Short-Circuit Boundary by Normal Mode Method—Through Impedance Matrix—, by T. Anada and H. J. Pang (Faculty of Engineering, Kanagawa University, Yokohama-shi, 221 Japan): *Trans. IECEJ*, vol. J61-B, pp. 646–653, July 1978.

A new method of analysis based upon scalar eigenfunctions is proposed and developed, by which the impedance matrix for a planar circuit having n-waveguide ports can be derived. Some examples of the numerical analysis are presented.

10

Periodic Filter Using Over-Moded Waveguide as Anisotropic Waveguide (Correspondence), by R. Watanabe (Yokosuka Electrical Communication Laboratory, N. T. T., Yokosuka-shi, 238-03 Japan): *Trans. IECEJ*, vol. J61-B, pp. 1047–1048, December 1978.

A report on development. A branching loss of 0.33 dB has been achieved in 30-GHz band.

11

Calculation of the Resonant Frequency of a Microstrip Disk Resonator (Correspondence), by Y. Hayashi (Faculty of Engineering, Kitami Institute of Technology, Kitami-shi, 090 Japan), T. Kitazawa and M. Suzuki (Faculty of Engineering, Hokkaido University): *Trans. IECEJ*, vol. J61-B, pp. 1053–1055, December 1978.

The edge effect is considered precisely to calculate the resonant frequencies of TM_{mn0} modes. The result is compared with that of static-model analysis.

Microwave-Integrated Circuits

1

Gold Alumina and Gold Quartz Bonds for Microwave Integrated Circuits, by J. Hubregtse (Telecom Australia Research Laboratories, Melbourne, Australia): *ATR* (*Australian Telecomm. Res.*), vol. 12, pp. 35–42, 1978.

The adhesion in gold/alumina and gold/quartz bonds used commonly in MIC's are discussed upon three models: 1) direct bonding, 2) bonding using an intermediate oxygen-active metal layer, and 3) reactively bonded gold.

Ferrite and Acoustic Devices

1

The Coupling Between Elastic Surface Modes in Two Parallel Piezoelectric Waveguides, by M. Shimizu (Sanyo Electric Company), M. Tsutsumi and N. Kumagai (Faculty of Engineering, Osaka University, Suita-shi, 564 Japan): *Trans. IECEJ*, vol. J61-B, pp. 189–195, March 1978.

Purterbation theory is used to compute the coupling coefficients between the Love waves, Rayleigh waves, and between a Love wave and a Bleustein–Glyaev–Shimizu (BGS) wave. Numerical examples are presented.

2

Amplification of Magnetostatic Surface Wave in GaAs–YIG Layered System (Correspondence), by S. Yamada, N. S. Chang, and Y. Matsuo (Institute of Scientific and Industrial Research, Osaka University, Suita-shi, 565 Japan): *Trans. IECEJ*, vol. J61-B, pp. 412–413, May 1978.

An experiment is described in which a 14-dB relative gain has been achieved by a n-GaAs/YIG system.

3

Propagation Characteristics of Magnetoelastic Love-Wave Semiconductor Composite System (Correspondence), by Y. Ikuzawa, N. S. Chang, and Y. Matsuo ((Institute of Scientific and Industrial Research, Osaka University, Suita-shi, 565 Japan): *Trans. IECEJ*, vol. J61-B, pp. 677–678, July 1978.

It is shown that a magnetoelastic surface wave in a ferrite-metal system couples piezoelectrically with a carrier wave in the semiconductor.

4

A Consideration on Finite-Element Analysis of Piezoelectric Elastic Waveguides, by M. Koshiba (Kitami Institute of Technology, Kitami-shi, 090 Japan), and M. Suzuki (Faculty of Engineering, Hokkaido University): *Trans. IECEJ*, vol. J61-B, pp. 689–696, August 1978.

Conditions for expressing variables (such as the material displacement and electric potential) as real variables are considered. Examples of the numerical analysis are presented to prove the proposed formulation.

5

Equivalent Network Analysis of Acoustic Wave Propagation in Composite Thin Plates and its Applications, by M. Koshiba (Kitami Institute of Technology, Kitami-shi, 090 Japan), and M. Suzuki (Faculty of Engineering, Hokkaido University): *Trans. IECEJ*, vol. J61-B, pp. 697–704, August 1978.

The "composite thin plates" in the title means that thin plates of different materials are joined in a direction normal to both the directions of the thickness of the plate and the wave propagation. Results of the analysis are compared with those of finite-element method.

6

A Numerical Analysis of Waveguide *H*-Plane Y-Junction Circulator with Circular Partial-Height Ferrite Post, by Y. Akaiwa (Central Research Laboratories, Nippon Electric Company, Kawasaki-shi, 213 Japan): *Trans. IECEJ*, vol. E61, pp. 609–617, August 1978.

So far most of the analysis of *Y*-circulator has assumed full-height ferrite (FHF), whereas in actual devices partial-height ferrite (PHF) is the common practice. A numerical analysis for the PHF model is presented. The theory shows good agreement with experiment.

7

A Consideration on Accuracy in the Numerical Calculation of Elastic Waveguide by Mode-Matching Method (Correspondence), by T. Miyamoto (Faculty of Engineering, Fukuoka University, Fukuoka-shi, 814 Japan): *Trans. IECEJ*, vol. J61-B, pp. 814–815, September 1978.

It is shown that the mode-matching method can offer a high accuracy even when the waveguide has an arbitrary cross section.

8

Acoustic Surface Modes in the Overlay Ridge Waveguide (Correspondence), by M. Koshiba (Kitami Institute of Technology, Kitami-shi, 090 Japan), and M. Suzuki (Faculty of Engineering, Hokkaido University): *Trans. IECEJ*, vol. J61-B, pp. 972–973, November 1978.

Solutions for aluminum/T40-glass and gold/fused-silica structures are obtained, and technical features of each structure are discussed.

Transmission Lines and Waveguides

1

Loss-Ripple Characteristics of Millimetric Waveguides, by F. Nihei and S. Hatano (Ibaraki Electrical Communication Laboratory, N. T. T., Ibaraki-ken, 319-11 Japan: *Trans. IECEJ*, vol. J61-B, pp. 32–39, January 1978.

The attenuation in a long millimeter waveguide consists of constant and frequency-dependent ripple-like components. The latter stems from the mode conversion which is inevitable when the waveguide is laid in under-street tunnels. In this paper, the ripple component is estimated and compared with experiment.

2

Transmission Characteristics and Design Method of Cross-Section Configuration and Dimension of a Cocoon-Section Waveguide, by K. Abe and M. Yamasaki (Mitsubishi Electric Corporation, Kamakura-shi, 247 Japan): *Trans. IECEJ*, vol. J61-B, pp. 153–160, March 1978.

The Rayleigh–Ritz variational method is used in the analysis of the characteristics. Transmission characteristics are presented and design criteria are discussed.

3

A Comparison of Transmission Characteristics Between Rectangular Circular, Elliptical and Cocoon-Section Waveguides (Correspondence), by K. Abe (Mitsubishi Electric Corporation, Kamakura-shi, 247 Japan): *Trans. IECEJ*, vol. J61-B, pp. 212–214, March 1978.

Characteristic impedance and transmission loss of the four kinds of metallic waveguides are compared under conditions of constant cross-sectional area and constant peripheral length.

4

Considerations on Impedance-Irregularity Tests of Coaxial Pair Cable Transmission Lines, by Y. Yamamoto and N. Kojima (Ibaraki Electrical Communication Laboratory, N. T. T., Ibaraki-ken, 319-11 Japan): *Trans. IECEJ*, vol. J61-B, pp. 227–234, April 1978.

So far pulse-reflection time-domain measurement, return-loss frequency-domain measurement, and average-pulse-echo measurement have been employed in the impedance-irregularity test. This paper compares these three methods, both theoretically and experimentally.

5

Coupling of a Single-Mode Waveguide and a Multimode Waveguide, by T. Yoneyama (Research Institute of Electrical Communication, Tohoku University, Sendai-shi, 980 Japan), Y. Suzuki (Radio Research Laboratories, Ministry of Post and Telecommunication, Koganei-shi, 184 Japan), and S. Nishida (Research Institute of Electrical Communication): *Trans. IECEJ*, vol. J61-B, pp. 405–411, May 1978.

A general theory of the coupling from a single-mode waveguide to a multimode one is presented. It is shown that a leaky wave must be present for the coupling. An experiment at 8.5 GHz has been performed to show the validity of the theory.

6

Finite-Element Analysis of Coplanar-Type Striplines (Correspondence), by M. Ikeuchi and K. Inoue (Faculty of Science and Engineering, Ritsumeikan University, Kyoto-shi, 603 Japan), and H. Sawami and H. Niki (Faculty of Science, Okayama College of Science): *Trans. IECEJ*, vol. J61-B, pp. 421–423, May 1978.

The dispersion relation is derived for various geometrical parameters. The effect of the so-called spurious solution on the accuracy of the result is discussed.

7

Experimental Investigation of Miter Elbows for Circular Millimeter Waveguides, by H. Murata, Y. Tamura, and T. Sato (Ibaraki Electrical Communication Laboratory, N. T. T., Ibaraki-ken, 319-11 Japan): *Trans. IECEJ*, vol. J61-B, pp. 449–456, June 1978.

Transmission characteristics of a circular 90-degree elbow (diameter: 51 mm) was measured first as functions of frequency. The design of a transmission line including many such elbows is discussed.

8

A Low-Loss Dielectric Waveguide for Millimeter and Submillimeter Wavelengths, by K. Yamamoto (Yokosuka Electrical Communication Laboratory, N. T. T., Yokosuka-shi, 238-03 Japan): *Trans. IECEJ*, vol. J61-B, pp. 616–623, July 1978.

At 1,000 GHz for example, $\tan \delta = 2.6 \times 10^{-9}$ for N_2 gas, and is much lower than (about 10^{-5} times) that of low-loss dielectrics. This paper proposes and analyzes a structure in which a low-loss gas ($n = 1.01$, for example) is confined in a thin dielectric pipe. Numerical examples are presented.

9

Analysis of Dielectric Tape Line, by T. Wakabayashi and Y. Mihara (Faculty of Engineering, Tokai University, Hiratsuka-shi, 259-12 Japan): *Trans. IECEJ*, vol. J61-B, pp. 880–887, October 1978.

The structure dealt with in this paper consists of a metallic substrate and a dielectric tape having a finite thickness (but much thinner than its width) placed on the substrate. An analytic solution is obtained. The result shows good agreement with experiment.

10

Equivalent Circuits for the Electromagnetic Field of Inhomogeneous Dielectric Lines Derived by Finite Element Method, by M. Ikeuchi and K. Inoue (Faculty of Science and Engineering, Ritsumeikan University, Kyoto-shi, 603 Japan), and H. Sawami and H. Niki (Okayama College of Science): *Trans. IECEJ*, vol. J61-B, pp. 888–895, October 1978.

Various lumped-constant equivalent circuits are derived from the solution obtained by using the finite element method.

11

Measurement Method of Spurious-Mode Phase-Characteristics in Millimetric Waveguides, by H. Murata (Ibaraki Electrical Communication Laboratory, N. T. T., Ibaraki-ken, 319-11 Japan): *Trans. IECEJ*, vol. J61-B, pp. 1008–1013, December 1978.

For complete understanding of the transmission characteristics, the phase of spurious modes must be measured. The proposed method features the use of a "standard spurious mode generator" to compare with the existing spurious modes.

Optical Fibers

1

Synthesis of Optical Waveguide Using Inverse Differential Operator Theory, by M. Murakami (N. T. T., Tokyo, 100 Japan) and M. Saito (Faculty of Medicine, University of Tokyo, Tokyo 113 Japan): *Trans. IECEJ*, vol. J61-C, pp. 83–90, February 1978.

The synthesis of the refractive-index profile of an axially symmetrical optical fiber having given propagation constants is discussed. The algorithm by Gel'fand and Levitan is used.

2

Structural Characteristics of Optical Fiber, by E. Johansen and P. V. H. Sabine (Telecom Australia Research Laboratories, Melbourne, Australia): *ATR* (*Australian Telecomm. Res.*), vol. 12, pp. 25–39, 1978.

In the former half the modified chemical vapor deposition (MCVD) technique is outlined. In the latter half, it is shown that the scanning electron microscope (SEM), when combined with chemical etching, offers a powerful tool to visualize the composition profile of a fiber.

3

Mode Dispersion Characteristics in Multimode Optical Fibers with Polynomial Refractive-Index Profiles, by Y. Satomura, T. Kirimoto, M. Matsuhara, and N. Kumagai (Faculty of Engineering, Osaka University, Suita-shi, 565 Japan): *Trans. IECEJ*, vol. J61-C, pp. 150–155, March 1978.

The optimum-index profile is investigated within polynomial-variation assumption (constant, linear, and quadratic terms). Power-series expansion method is used in the analysis. It is concluded that nearly quadratic profile with index valley of an appropriate depth at the core-cladding boundary is the best solution.

4

Some Trends in Low-Loss Optical Fiber and Cabling Technologies, by R. J. Morgan (Telecom Australia Research Laboratories, Melbourne, Australia): *Monitor* (*Proc. IREE Aust.*), vol. 39, pp. 56–72, May 1978.

A tutorial-review paper. The main topics discussed are 1) high-yield production of optical fiber cables, 2) application to public networks, and 3) ultra-low-loss transmission at 1.0–1.3-μm wavelengths.

5

Transmission Characteristics of Mode-Coupled Graded-Index Multimode Optical Fibers, by Y. Suematsu and H. Tokiwa (Tokyo Institute of Technology, Tokyo, 152 Japan): *Trans. IECEJ*, vol. E61, pp. 355–362, May 1978.

The transfer function of a multimode optical fiber having an arbitrary refractive-index profile and any length is derived, taking into account the coupling between modes brought about by random bending of the fiber.

6

Some Considerations on Transfer Function of Mode-Coupled Multimode Fiber, by H. Kajioka (Research Laboratory, Hitachi Cable, Ltd., 100 Japan): *Trans. IECEJ*, vol. J61-B, pp. 791–795, September 1978.

The transfer function is computed from the product of the "mode-power transition matrices" defined for appropriately divided sections of the multimode fiber. The physical implications of the mode-power transition matrix is discussed.

7

Misalignment Loss and Bend Loss of Single-Mode Optical Fiber (Correspondence), by M. Matsuhara and N. Kumagai (Faculty of Engineering, Osaka University, Suita-shi, 565 Japan): *Trans. IECEJ*, vol. J61-C, pp. 607–608, September 1978.

The desirable refractive-index profile is pursued. It is concluded that no particular index profile is absolutely preferable.

8

Analysis of Discontinuities in Dielectric Waveguides by Means of Least Squares Boundary Residual Method, by S. Inagaki, K. Morishita, and N. Kumagai (Faculty of Engineering, Osaka University, Suita-shi, 565 Japan): *Trans. IECEJ*, vol. J61-C, pp. 621–627, October 1978.

A new method based upon least-square principle is devised, and applied to off-axis discontinuities between two dielectric waveguides. The results are compared with those of Mahmoud's method and Marcuse's method.

9

Analysis of a Single-Material Fiber with Two Support Slabs of Different Thickness (Correspondence), by S. Sawa, K. Ono (Faculty of Engineering, Ehime University, Matsuyama-shi, 790 Japan), and H. Onoe (Sanyo Electric Company, Ltd.): *Trans. IECEJ*, vol. J61-C, pp. 651–652, October 1978.

The effect of the asymmetrical structure upon the field configuration and the propagation constant are investigated.

10

Estimation of Transmission Loss in Graded Index Fiber Connectors and Splices, by Y. Daido, T. Iwama, and E. Miyauchi (Fujitsu Laboratories, Ltd., Kawasaki-shi, 211 Japan): *Trans. IECEJ*, vol. E61, pp. 816–819, October 1978.

The jointing loss in graded-index optical fibers is calculated by using the mode-expansion method as functions of the lateral (off-axis) displacement, tilt angle, and gap width.

11

Variational Solution of the Power-Flow Equation and Its Application to Random Bends in Graded-Index Optical Fibers, by K. Tatekura, K. Ito, and T. Matsumoto (Faculty of Engineering, University of Hokkaido, Sapporo-shi, 060 Japan): *Trans. IECEJ*, vol. E61, pp. 809–815, October 1978.

A new formulation applicable to any type of coupling is derived, and its general variational solution is obtained. The numerical solution for a step-index fiber shows good agreement with experiment.

12

A Simple Method for Measuring the Fundamental-Mode Content in a Multimode Fiber (Correspondence), by T. Iwasaki (Electrotechnical Laboratory, Tanashi-shi, 188 Japan): *Trans. IECEJ*, vol. J61-C, pp. 738–739, November 1978.

The content of the HE_{11} mode is measured from the intensity of the exit-radiation pattern at the center, by assuming that only HE_{11}, TE_{01}, TM_{01}, and HE_{21} modes are present.

13

Low-Loss Slicing of Single-Mode Fibers by Tapered-Butt Joint Method, by K. Furuya, T. C. Chong, and Y. Suematsu (Tokyo Institute of Technology, Tokyo, 152 Japan): *Trans. IECEJ*, vol. E61, pp. 957–961, December 1978.

After two single-mode fibers are spliced, the jointed part is heated again and stretched a little to make that part thinner. We may reduce the splicing loss appreciably by this tapering process because the effect of the offset decreases.

14

Precise Measurement of the Impulse Response of an Optical Fiber (Correspondence), by T. Okoshi and K. Sasaki (Faculty of Engineering, University of Tokyo, Tokyo, 113 Japan): *Trans. IECEJ*, vol. E61, pp. 964–965, December 1978.

By refining the deconvolution technique proposed previously by the same authors for determining the impulse response, the time resolution has been improved.

Optical Waveguides Other Than Fibers

1

Coupling Characteristics Between Optical Slab Waveguides with Gradual Distribution of Refractive Index, by T. Taniuchi, N. Kudo, and Y. Mushiake (Faculty of Engineering, Tohoku University, Sedai-shi, 980 Japan): *Trans. IECEJ*, vol J61-C, pp. 256–263, April 1978.

Stratified-layer analysis is used to investigate the coupling characteristics between two parallel optical slab waveguides. The influence of the index profile is much greater than in the transmission characteristics of a single waveguide.

2

Unificative Analysis of Guided and Radiation Modes in Anisotropic Slab Waveguides, by K. Kishioka and K. Rokushima (Faculty of Engineering, University of Osaka Prefecture, Sakai-shi, 591 Japan): *Trans. IECEJ*, vol. J61-B, pp. 511–518, June 1978.

Modes in anisotropic slab waveguides having arbitrary permittivity and permeability tensors are dealt with in a unified manner. The degenerated radiation modes are discussed.

3

Analysis of Three-Dimensional Scattering Patterns of Dielectric Slab Waveguide with Refractive Index Irregularity, by C. Fujihashi (Electro-Communication University, Chofu-shi, 182 Japan), T. Egashira, and H. Nagashima (Kogakuin University): *Trans. IECEJ*, vol. J61-C, pp. 347–354, June 1978.

The dependence of the scattering pattern upon the frequency, field configuration of the propagating mode, and power spectrum of the index fluctuation are discussed.

4

Sputtered Thin Films of Dy_2O_3-TiO_2 System for Optical Waveguide with High-Refractive-Index, by S. Yamanaka, M. Naoe, and K. Ishi (Faculty of Engineering, Tokyo Institute of Technology, Tokyo, 152 Japan): *Trans. IECEJ*, vol. J61-C, pp. 455–462, July 1978.

When TiO_2 (Rutile) film is made by sputtering for use in optical-waveguiding device, the surface irregularity is intolerably large. This paper proposes to add Dy_2O_3 for reducing the surface roughness; 10-dB/cm loss can be achieved at 632.8-nm wavelength.

5

Guided-to-Radiation Mode Conversion in $LiNbO_3$ Planar Waveguides—Coupled-Mode Analysis and Application to Intensity Modulator, by Y. Okamura, K. Yamamoto, and T. Makimoto (Faculty of Engineering Science, Osaka University, Toyonaka-shi, 560 Japan): *Trans. IECEJ*, vol. J56-C, pp. 579–586, September 1978.

The coupled-mode theory is used to analyze the mode conversion. Under an appropriate approximation, a closed-form solution of the coupled-mode equation can be derived.

Optical Components and Optical Integrated Circuits

1

Design Theory of the Coupled-Waveguide Optical Modulator with p-n Junction—Strip-Loaded Channel Waveguide Configuration, by K. Tada, K. Hirose, and H. Yanagawa (Faculty of Engineering, University of Tokyo, Tokyo, 113 Japan): *Trans. IECEJ*, vol. E61, pp. 1–7, January 1978.

A new type of optical modulator is proposed, in which two p^+-n-n^+ waveguides are placed parallel to each other, and the coupling between these is controlled by the voltage applied to the junctions. Modulation voltage of 2.4 V and bandwidth of 5 GHz are attainable.

2

Guided-Wave Acousto-Optic Bragg Deflection in $LiNbO_3$ Ti-Diffused Waveguides, by R. D. Jeffery and J. Livingstone (Department of Electrical and Electronics Engineering, The University of Western Australia): *Monitor* (*Proc. IREE Aust.*), vol. 39, pp. 92–96, June 1978.

Bragg deflection with 50 percent efficiency over 82-MHz bandwidth around 353 MHz is demonstrated. The required deflection power is 240 mW.

3

Improvement of Coupling Efficiency in Grating Coupler by Introduction of Double Grating, by T. Kirimoto (Mitsubishi Electric Company), M. Matsuhara, and N. Kumagai (Faculty of Engineering, Osaka University, Suita-shi, 565 Japan): *Trans. IECEJ*, vol. J61-C, pp. 525–531, August 1978.

It is shown theoretically that the coupling efficiency can be improved appreciably by controlling the amplitude and relative phase of the two corrugations of the double grating. The coupled-mode theory is used.

4

Analysis of Anisotropic Dielectric Branching Waveguide—Its Application to TE–TM Mode Convertor, by H. Yajima (Electrotechnical Laboratory, Tanashi-shi, 188 Japan): *Trans. IECEJ*, vol. J61-C, pp. 587–593, September 1978.

Properties of a dielectric waveguide branch are considered, in which one branch is made of isotropic material whereas the other is made of anisotropic material. It is shown that such a structure exhibits a TE–TM-mode conversion property.

5

Narrow-Bandwidth Optical Wave Filter with Stacked Directional Coupler (Correspondence), by M. Nunoshita and T. Nakayama (Central Research Laboratories, Mitsubishi Electric Company, Amagasaki-shi, 661 Japan): *Trans. IECEJ*, vol. E61, pp. 727–728, September 1978.

A report on experiment. A 3-dB bandwidth of 0.2 nm (center wavelength: 616.8 nm) has been obtained with Ti–diffused–$LiNbO_3$/Corning-7059-glass/As_2S_5 structure.

Measurements

1

Precise Dielectric Measurements at 100 GHz Range Using Fabry–Perot Resonator (Correspondence), by R. Watanabe and N. Nakajima (Yokosuka Electrical Communication Laboratory, N.T.T., Yokosuka-shi, 238-03 Japan): *Trans. IECEJ*, vol. J61-B, pp. 205–206, March 1978.

Precise data on dielectric materials at 100 GHz band is important because low-loss transmission might become possible using a dielectric waveguide. A new precise measuring system has been developed for this purpose.

2

Consideration of *S*-Curve of Cylindrical Cavity Resonator (Correspondence), by K. Taketomi (Gifu Technical College, Gifu-ken, 501-04 Japan): *Trans IECEJ*, vol. J61-B, pp. 815–816, September 1978.

The effect of higher order modes on the shape of the *S*-curve is investigated both theoretically and experimentally.

3

Thermistor-Bolometer with Negative Feedback Loop in the Submillimeter Wave Region (Correspondence), by M. Tsuji, H. Shigesawa, and S. Suhara (Department of Electronics, Doshisha University, Kyoto-shi, 602 Japan): *Trans. IECEJ*, vol. J61-B, pp. 973–974, November 1978.

A report on development. The response time is improved from 8 to 1.5 s by the addition of the negative feedback loop.

Microwave and Optical Systems

1

Hologram Memory Using One-Dimensional Fourier-Transform Image Hologram, by K. Kubota, M. Kondo, S. Sugama, and S. Takahashi (Central Research Laboratory, Nippon Electric Company, Kawasaki-shi, 213 Japan): *Trans. IECEJ*, vol. J61-C, pp. 379–386, June 1978.

A holographic read-only memory (ROM) using 1-m hologram tape has been developed. This features the Fourier-transform-hologram recording in one direction and the image-hologram recording in the orthogonal direction. Voice information corresponding to 12 Mbit (120 words) can be recorded and read out simultaneously.

2

Microwave Heating of a Dielectric Slab by Elliptical Waveguides, by S. Washisu and I. Fukai (Faculty of Engineering, Hokkaido University, Sappro-shi, 060 Japan): *Trans. IECEJ*, vol. J61-B, pp. 640–645, July 1978.

Field configurations, distributions of the heat generation, and the resultant temperature rise are calculated by using the finite-element method. Practical considerations are presented.

3

Variable Equalizer for Step-Index-Fiber Transmission System (Correspondence), by K. Nakagawa (Yokosuka Electrical Communication Laboratory, N.T.T., Yokosuka-shi, 238-03 Japan): *Trans. IECEJ*, vol. J61-B, pp. 1052–1053, December 1978.

A variable 32 Mbit/s equalizer has been developed using two varactor diodes and three transistors.