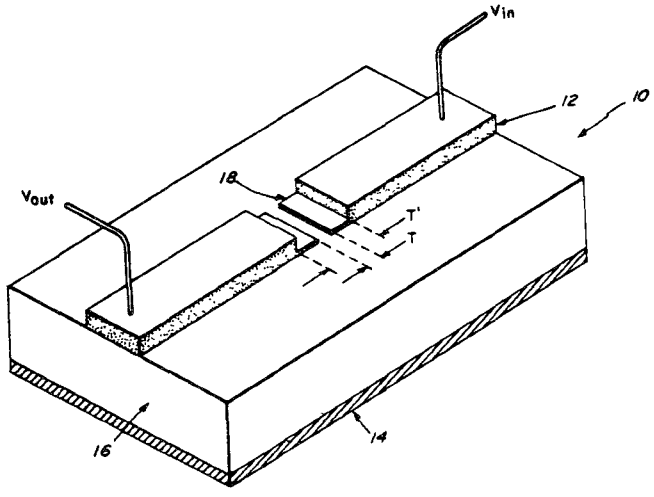
formation of an optically semi-transparent metallic film at the gap surface. This provides greater efficiency in the coupling of light into the device at the gap while at the same time maintaining a short electronically nonconductive gap and thus a relatively low ON-state impedance for the switch.

16 Claims, 17 Drawing Figures



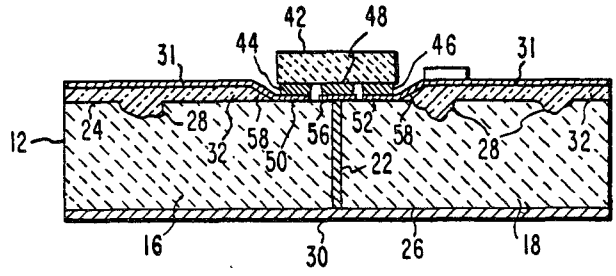
4,376,287 Mar. 8, 1983

Microwave Power Circuit with an Active Device Mounted on a Heat Dissipating Substrate

Inventor: Franco N. Sechi.
Assignee: RCA Corporation.
Filed: Oct. 29, 1980.

Abstract—A microwave power circuit includes a thermally conductive, electrically insulating substrate such as beryllium oxide which has a relatively rough surface, a layer of dielectric material such as glass on a portion of the rough surface which layer has a relatively smooth surface, a conductive material on the relatively smooth surface, and a heat dissipating amplifying device having at least two terminals, one of which is connected to the conductive material and one of which is thermally connected to the substrate in a manner to pass heat thereto.

8 Claims, 4 Drawing Figures



Asian Abstracts

Papers from Journals Published in Australia, India, and Japan in 1982

Compiled by Prof. E. Yamashita (with the assistance of Dr. Y. Suzuki), University of Electro-Communications, Tokyo, 182 Japan.

The periodicals investigated are: 1) Transactions of the Institute of Electronics and Communication Engineers of Japan (Trans. IECEJ), 2) Journal of the Institution of Engineers, Electronics and Telecommunication Engineering Division, India, (JIE, Part ET), 3) Journal of the Institution of Electronics and Telecommunication Engineers, India, (JIETE), 4) Journal of Electrical and Electronics Engineering, Australia, (JEEE), and 5) Australian Telecommunication Research (ATR).

As for the Japanese papers in the *Trans. IECEJ*, which carry volume numbers J65-B or J65-C, short English summaries are found in the *Trans. IECEJ*, vol. E65, issued in the same month. Papers carrying volume number E65 are papers originally written in English. These issues are published from the IECEJ, Kikai-Shinko-Kaikan, 3-5-8, Minato-ku, Tokyo 105, Japan.

The full translations of some Japanese papers will appear in Electronics and Communications in Japan, published by Scripta Publishing Co., 7961 Eastern Avenue, Silver Spring, MD 20910.

The abstracts of these papers are grouped as follows:

1) Active Microwave Devices
2) Passive Microwave Devices
3) Transmission Lines and Waveguides

4) Microwave Integrated Circuits
5) Microwave Field and Circuit Theory
6) Microwave Antennas
7) Microwave Propagation
8) Microwave Holography
9) Microwave Thermal Effects
10) Optical Fibers
11) Optical Waveguides Other Than Fibers
12) Optical Devices
13) Measurements

Active Microwave Devices

1

Phase-Locked Gunn Oscillator at 21 GHz, by R. S. Arora and N. V. G. Sarma (Raman Research Institute, Bangalore, 560 080 India): *JIETE*, vol. 28, pp. 22–25, Jan. 1982.

The oscillator gives a maximum CW power output of 60 mW, bias-tuning range of 40 MHz, and DSB AM noise of −140 dBc in 1-kHz bandwidth at 1.4 GHz away from the carrier. The phase-lock scheme is highly versatile and can be used for a variety of solid-state millimeter-wave sources.

2

Mathematical Representation of Microwave Oscillators by Use of the Rieke Diagram, by K. Fukumoto, M. Nakajima, and J. Ikenoue (Faculty of Engineering, Kyoto University, Kyoto-shi, 606 Japan): *Trans. IECEJ*, vol. J65-B, pp. 310–316, Mar. 1982.

The nonlinear admittance of an oscillator is expressed as a polynomial function of frequency and amplitude based on data on the Rieke diagram, provided that output signal is nearly sinusoidal.

3

A 2-Gbit/s Decision Circuit Using Bipolar Transistors (Letters), by N. Ohta and K. Ohue (Yokosuka Electrical Communication Lab., N.T.T., Yokosuka-Shi, 238-03 Japan): *Trans. IECEJ*, vol. J65-B, pp. 332–333, Mar. 1982.

The flip-flop operation of a totem-pole circuit combined with a spike pulse generator was realized with the decision uncertainty width of 62 mV at 2 GHz clock frequency.

4

1-GHz 2-Modulus Prescaler MSI with a Direct Feedback Loop, by K. Yamashita (Central Research Lab., Hitachi Ltd., Kokubunji-shi, 185 Japan), T. Kaji (Device Development Center, Hitachi Ltd., Kodaira-shi, 187 Japan), K. Kanouta (2nd Engineering Dept., Hitachi Denshi Ltd., Kodaira-shi, 187 Japan) and Y. Sekine (Device Development Center, Hitachi Ltd.): *Trans. IECEJ*, vol. J65-C, pp. 147–161, Mar. 1982.

This paper describes the integrated circuit design and the characterization of two-modulus prescalers with a direct feedback loop and the operating frequency of 1 GHz, which were realized by using transistors with the emitter area of $3\times5\ \mu m^2$.

5

Performance of a Microwave Amplitude Limiter Using GaAs MESFET, by S. Komaki and O. Kurita (Yokosuka Electrical Communication Lab., N.T.T., Yokosuka-shi, 238-03 Japan): *Trans. IECEJ*, vol. J65-B, pp. 440–447, Apr. 1982.

The equivalent circuit of a FET limiter and a method to minimize the AM-PM conversion are discussed. Experimental results at 1.7-2.0 GHz agree with this theory.

6

A Comment on a Modulation Enhancement of Electronic Phase Shifter Employing a Multilayer Dielectric Waveguide Structure (Letters), by K. Araki and Y. Naito (Faculty of Engineering, Tokyo Institute of Technology, Tokyo, 152 Japan): *Trans. IECEJ*, vol. E65, pp. 208–209, Apr. 1982.

The change of material constants in the case of electronic phase shifters is enhanced by using multilayer dielectric waveguide structures. The upper limit of the enhancement is derived from the general theory of dielectric waveguides.

7

A Highly Stabilized Low-Noise Microstripline Gunn Oscillator Using a Dielectric Resonator, by D. N. Singh and A. K. Basu (Microwave Engineering Group, Tata Institute of Fundamental Research, Homi Bhabha Road, Colaba, Bombay, 400 005 India): *JIETE*, vol. 28, pp. 144–146, Apr. 1982.

The frequency stability of the oscillator with a Barium Nonatitanate ($Ba_2Ti_9O_{20}$) dielectric resonator is about 5 ppm/°C. The oscillator can be mechanically tuned between 8.4 GHz and 8.6 GHz. The FM noise of the stabilized oscillator has been also measured.

8

Microwave Endless Phase Shifter Using Dual-Gate FET, by H. Ichikawa and S. Komaki (Yokosuka Electrical Communication Lab., N.T.T., Yokosuka-shi, 238-03 Japan): *Trans. IECEJ*, vol. J65-B, pp. 715–722, June 1982.

A new endless phase shifter for MIC's can be built by using the amplitude modulation of four dual-gate FET's and the 90° phase shift of hybrids. Experimental results at 4.5 GHz are shown.

9

Stabilization of Injection-Locked Mode Amplifier Having an Opposite Phase Self-Injection Circuit (Letters), by Y. Iida, S. Haseno, and M. Morita (Faculty of Engineering, Kansai University, Suita-shi, 564 Japan): *Trans. IECEJ*, vol. J65-B, pp. 801–802, June 1982.

The stabilization of an injection-locked mode amplifier with a PLL broadbanding circuit is experimentally studied at 9 GHz.

10

***L*-Band Microstrip Low-Noise Amplifier** (Letters), by R. Verma and U. K. Ravankar (Radar Division, LRDE, High Grounds, Bangalore, 560 001 India): *JIETE*, vol. 28, pp. 370–372, July 1982.

By using the NE645(80), n–p–n Silicon Bipolar transistor, two stages of *L*-band low-noise amplifier in microstrip line construction on teflon fibre glass have been developed. The amplifier has achieved minimum noise figure of 1.8 dB and 26-dB gain in the frequency band 1.2 to 1.4 GHz.

11
Source-Coupled GaAs MESFET Voltage-Controlled Multivibrator Circuit (Letters), by R. Kawasaki and M. Hirayama (Musashino Electrical Communication Lab., N.T.T., Musashino-shi, 180 Japan): *Trans. IECEJ*, vol. J65-B, pp. 1064–1065, Aug. 1982.

The results of analysis on this VCM circuit show the maximum oscillation frequency of 3.5 GHz and the variable frequency range of 50 percent to the center frequency.

12
Millimeter Wave Video Detection Using Pb Thin Film Microbridge Josephson Junction, by S. Yoshimori and M. Kawamura (Faculty of Engineering, Tokyo Institute of Technology, Tokyo, 152 Japan): *Trans. IECEJ*, vol. J65-C, pp. 622–628, Aug. 1982.

This paper describes the thermal noise in the Josephson junction, and the wave form and the responsivity of video detection. Experimental results at 70 GHz are shown.

13
Influence of Waveguide Height on Varactor-Tuned Gunn Oscillator, by R. C. Sararwat (Electrical Engineering Dept., Guru Nanak Engineering College, Ludhiana, 141 006 India), S. Sarkar (Dept. of E. and C., University of Roorkee, Roorkee, 247 672 India), and S. K. Saha (Electrical Engineering Dept., College of Technology, G. B. Pant University, Pantnagar (Nainital), 263 145 India): *JIETE*, vol. 28, pp. 407–410, Aug. 1982.

Experimental observations show that the tuning improves with the reduction of waveguide height at the expense of power output. An equivalent circuit for varactor-tuned waveguide Gunn oscillator is presented.

14
Target Output Circuits for 4-GHz Band Deflection-Modulated EBS Amplifiers, by H. Makishima and O. Mitomi (Musashino Electrical Communication Lab., N.T.T., Musashino-shi, 180 Japan): *Trans. IECEJ*, vol. J65-C, pp. 705–712, Sept. 1982.

New types of target output circuits are proposed for a 4-GHz band deflection-modulated electron-bombarded semiconductor amplifier. Experimental results show the maximum output of 4.7 W at 4.25 GHz.

15
Analysis of Simultaneous Three-Frequency Oscillation in Gunn Diodes, by Y. Iida, M. Morita, and Y. Nakajima (Faculty of Engineering, Kansai University, Suita-shi, 564 Japan): *Trans. IECEJ*, vol. J65-B, pp. 1237–1244, Oct. 1982.

The simultaneous three-frequency oscillation of a Gunn diode oscillator with a double-waveguide cavity has been observed at 9 GHz. This phenomenon is analyzed with a Gunn diode model and a non-linear active element model.

16
A Single-Mode Parallel-Running System of 2^N Oscillators, by S. Hayama (Numazu Technical College, Numazu-shi, 410 Japan): *Trans. IECEJ*, vol. J65-B, pp. 1377–1384, Nov. 1982.

A parallel-running system of 2^N oscillators using 3-dB directional couplers is described. The results of preliminary experiments with 16 oscillators at 30 MHz show that the output power is multiplied by about 16 and the spectrum is clean.

Passive Microwave Devices

1
Quarter-Wavelength Coupled Band-Stop Filter Using Varactor-Diodes (Letters), by S. Toyoda (Faculty of Engineering, Osaka Institute of Technology, Osaka-shi, 535 Japan): *Trans. IECEJ*, vol. J65-B, pp. 126–127, Jan. 1982.

The band-stop filter is composed of two resonant circuits placed with the distance of a quarter wavelength. The frequency of the maximum attenuation can be varied from 4.4 GHz to 7 GHz.

2
Development of Yttrium Iron Garnet Paste and Fabrication of Non-Reciprocal Microwave Components, by S. Kal, D. Bhattacharya, and N. B. Chakraborti (Dept. of Electronics and ECE, Indian Institute of Technology, Kharagpur, 721 302, India): *JIETE*, vol. 28, pp. 71–75, Feb. 1982.

A non-reciprocal field displacement isolator was fabricated on the YIG films. Insertion loss, isolation, and VSWR were measured. The results indicate that the devices made using YIG paste give better performance than those with ferrite pastes.

3
Analysis and Design of a High Directivity Compact Waveguide Coupler Using 3-Hole Aperture Array, by G. J. Chaturvedi and D. Guha (Electronics and Communication Dept., University of Roorkee, Roorkee, 247 672 India): *JIETE*, vol. 28, pp. 107–110, Mar. 1982.

A new approach for designing a multi-hole waveguide coupler for *X*-band is proposed. The method of analysis and design is partly from Shelton, Hensperger, and Levy. It has been possible to achieve a directivity greater than 38 dB in a length of 17.5 cm.

4
Performance Comparison on Infrared and Millimeter-Wave Detector, by H. Kuno (Electronics Equipment Div., Toshiba Corporation, Kawasaki-shi, 210 Japan): *Trans. IECEJ*, vol. J65-B, pp. 402–408, Apr. 1982.

The results of investigation on the performance of infrared and millimeter wave detectors show that the hybrid system of 4.5 μm and 35-GHz waves is the best combination for aircraft detection.

5
A Consideration on Broadbanding of n-Way Hybrid Power Dividers, by H. Watanabe, N. Nagai, K. Ono, and K. Hatori (Research Institute of Applied Electricity, Hokkaido University, Sapporo-shi, 060 Japan): *Trans. IECEJ*, vol. J65-B, pp. 463–470, Apr. 1982.

New types of n-way planar and radial-line hybrid power dividers with quater-wave lines are proposed as the dividers having low VSWR values at the input port over a broad frequency range.

6

Influence of the Structural Parameters on the Response Characteristics of Pb Thin-Film Microbridge Josephson Junction under Millimeter Wave Radiation, by S. Yoshimori and M. Kawamura (Faculty of Engineering, Tokyo Institute of Technology, Tokyo, 152 Japan): *Trans. IECEJ*, vol. J65-C, pp. 237–243, Apr. 1982.

Josephson junction devices with submicron dimensions were fabricated by the electron beam lithography technique. The dependence of the device characteristics on bridge width and film thickness was experimentally investigated at 70 GHz.

7

Grating Diplexer Using Dielectric Waveguides for Millimeter Wavelengths, by H. Shinonaga and S. Kurazono (Faculty of Engineering, Osaka University, Suita-shi, 565 Japan): *Trans. IECEJ*, vol. J65-B, pp. 703–709, June 1982.

A novel diplexer for millimeter wave integrated circuits is proposed which consists of two 3-dB hybrids and two grating sections. The F, S, and T matrices are applied to the analysis of its equivalent circuit.

8

Miniaturization of Stripline Hybrid-Coupled Diode Phase Shifter and Its Widebanding Method, by M. Matsunaga and F. Takeda (Mitsubishi Electric Corp., Kamakura-shi, 247 Japan): *Trans. IECEJ*, vol. J65-B, pp. 710–714, June 1982.

Experimental results on the hybrid coupled phase shifter show the bandwidth of 26 percent, the phase shift errors less than 7.4°, the transmission loss less than 1.4 dB, and the VSWR less than 1.6.

9

Coupled Microstrip-Slot-Line Directional Coupler, by H. Ogawa, T. Hirota, and M. Aikawa (Yokosuka Electrical Communication Lab., N.T.T., Yokosuka-shi, 238 Japan): *Trans. IECEJ*, vol. J65-B, pp. 882–889, July 1982.

The Galerkin's method in the Fourier Transform domain is used for the hybrid-mode analysis of two orthogonal modes of the directional coupler. A 3-dB coupler for the 26-GHz band was designed and fabricated on 0.3-mm alumina substrate.

10

Microwave Components Using Ferrimagnetic Pastes, by C. K. Maiti, D. Bhattacharya, S. Kal, and N. B. Chakrabarti (Dept. of Electronics and Electrical Communication Engineering, Indian Institute of Technology, Kharagpur, 721 302, India): *JIETE*, vol. 28, pp. 324–329, July 1982.

Ferrimagnetic pastes have been developed using Mg–Mn-, Mn–Ni-, Li-, and Cu-doped magnesium ferrite alminate and YIG powder. The performance of the devices using the pastes have been compared with those on ferrite substrates over the frequency range from 2 to 8 GHz.

11

Right-Angled Isosceles Triangular T-Junctions and Their Applications in Stripline Power Dividers, by R. Chadha (Dept. of Electric Engineering, University of Waterloo, Waterloo, Canada), and K. C. Gupta (Dept. of Electric Engineering, Indian Institute of Technology, Kanpur, 208 016 India): *JIETE*, vol. 28, pp. 329–332, July 1982.

Right-angled isosceles triangular shaped microstrip and stripline T-junctions with impedance ratio $(1/\sqrt{2}):1:1$ have been shown to exhibit lower parasitic reactances as compared to the junctions with rectangular geometry normally used.

12

Broadband Directional Couplers Using Microstrips-Microslot Line, by B. Bhat (Centre for Applied Research in Electronics, Indian Institute of Technology, New Delhi, 910 016 India), H. K. Subbaramayya (Defence Research & Development Lab., Hyderabad, 500 258 India), and S. K. Kimothi (Directorate of Technical Development and Production (Air), Ministry of Defence, New Delhi, 110 001 India): *JIETE*, vol. 28, pp. 332–336, July 1982.

The development and performance feature of De Ronde-type broadband directional couplers using microstrip-microslot combination are reported.

13

Geometrical Tolerance Effects in Branch-Line and Rat-Race Hybrids, by G. Kumar and K. C. Gupta (Dept. of Electrical Engineering, Indian Institute of Technology, Kanpur, 208 016 India): *JIETE*, vol. 28, pp. 336–345, July 1982.

Effects of geometrical tolerances on the performance of two-branch, three-branch, and rat-race hybrids are discussed. It is seen that the effect of tolerances on the overall performance is least in the case of the rat-race hybrid.

14

Design and Development of Microstrip Hairpinline Filters for a Compact Down-Converter (Letters), by C. V. Ramaseshan and R. G. Zalawadia (Space Application Centre, ISRO, Ahmedabad, 380 053 India): *JIETE*, vol. 28, pp. 373–376, July 1982.

Two filters have been designed using the experimentally obtained values of coupling coefficient against resonator spacing. The tuning arrangements of these filters are discussed and experimental data are shown.

15

A Lumped-Element Attenuator at Microwave Frequencies (Letters), by R. Chattopadhyaya and I. K. L. N. Murthy (Indian Telephone Industries Ltd., Bangalore, 560 016 India) and K. Shyam (Electronic Weighing & Level Controls Pvt. Ltd., Bangalore, 560 016 India): *JIETE*, vol. 28, pp. 377–378, July 1982.

The basic advantages of a lumped attenuator are its compact size and the broadband performance offered. The operation was extended to 1 GHz for a bridged-T attenuator on rexolite in a preliminary investigation.

16

Realizability Constraints on Edge-Coupled Stripline Filters,

by P. A. Kirton (Telecom Australia Research Lab.) and K. K. Pang (Electrical Engineering Dept., Monash University): *ATR*, vol. 16, no. 2, pp. 39–46, 1982.

By an appropriate choice of impedance levels, dimensional constraints on achievable bandwidth for edge-coupled stripline filters may be considerably relaxed. This extends the realizable bandwidth for filters with parallel coupled impedance transformers from about 15 to 25 percent.

17

Design Method of Bandpass Filters Using Stepped-Impedance Co-Axial Resonators in the UHF Band, by M. Makimoto and S. Yamashita (Matsushita Research Institute Tokyo, Inc., Kawasaki-shi, 214 Japan): *Trans. IECEJ*, vol. J65-B, pp. 1052–1059, Aug. 1982.

A design formula of a bandpass filter with capacitive coupling is derived based on the lumped-constant element approximation, and verified with experimental results at 0.9 GHz.

18

On an Improvement of the Segmentation Method (Letters), by F. Kato (Fujitsu Lab., Ltd., Kawasaki-shi, 211 Japan): *Trans. IECEJ*, vol. J65-B, pp. 1062–1063, Aug. 1982.

This letter describes an analytical technique for improving the segmentation method, which is used for analyzing planar circuits, with the successive interconnection of subcircuits. The efficiency of computation by this technique is compared with that by other methods.

19

Spectral Domain Analysis of Slot Resonator, by K. Kawano and H. Tomimuro (Musashino Electrical Communication Lab., N.T.T., Musashino, 180 Japan): *Trans. IECEJ*, vol. E65, pp. 480–484, Aug. 1982.

The characteristic equation of slot resonators is obtained with the Galerkin's procedure in the Fourier transform domain. The numerical results of the end effect parameter are in good agreement with the experimental results published by other authors.

20

Dielectric Waveguide Mode Transformer for Rectangular and Circular Cross Section (Letters), by K. Matsumura (Faculty of Engineering, Utsunomiya University, Utsunomiya-shi, 321 Japan): *Trans. IECEJ*, vol. J65-B, pp. 1204–1205, Sept. 1982.

This mode transformer is a dielectric waveguide with gradually changing cross sections from rectangular to circular, and can particularly transform the $E_{11}^{\square}$ mode to the HE_{11}° mode.

21

Waveguide Power Divider Using Metallic Septum with Resistive Coupling Slot (Letters), by O. Ishida, Y. Isoda, and F. Takeda (Mitsubishi Electric Corp., Kamakura-shi, 247 Japan): *Trans. IECEJ*, vol. J65-B, pp. 1555–1556, Dec. 1982.

High isolation and low insertion loss have been obtained making use of a resistive coupling slot in a 3-dB waveguide power divider.

Transmission Lines and Waveguides

1

Analysis of the Dielectric Waveguides Using a Variational Method, by T. Tamura, K. Arai, and Y. Naito (Faculty of Engineering, Tokyo Institute of Technology, Tokyo, 152 Japan): *Trans. IECEJ*, vol. J65-B, pp. 109–115, Jan. 1982.

A novel variational expression for the propagation constants of dielectric waveguides is obtained by modifying the Konishi's method. The results of calculation are compared with other available data.

2

Transient Analysis of Waveguide Having *H*-Corner (Letters), by N. Yoshida, I. Fukai, and J. Fukuoka (Faculty of Engineering, Hokkaido University, Sapporo, 060 Japan): *Trans. IECEJ*, vol. E65, pp. 125–126, Feb. 1982.

A new numerical method for the transient analysis of electromagnetic fields is shown and used for characterizing an *H*-corner waveguide.

3

An Analysis for the Equivalence of Boxed and Shielded Strip Line by Using a Boundary Element (Letters), by T. Honma and I. Fukai (Faculty of Engineering, Hokkaido University, Sapporo-shi, 060 Japan): *Trans. IECEJ*, vol. J65-B, pp. 497–498, Apr. 1982.

The condition of equivalence between boxed strip lines and shielded strip lines for the immunity test of electronic equipments is discussed based on a numerical analysis.

4

Modal Analysis of Composite Dielectric Waveguides with Multi-Boundaries in Radial Directions, by K. Atsuki, T. Aslam, and E. Yamashita (Dept. of Applied Electronics, University of Electro-Communications, Chofu-shi, 182 Japan): *Trans. IECEJ*, vol. E65, pp. 189–193, Apr. 1982.

The modal characteristics of the composite dielectric waveguides as a new type of single-polarization optical fibers are studied with a numerical analysis based on the point-matching method. The results of microwave model experiments at 2–18 GHz are shown.

5

Millimeter Wave Radiation from a Corrugated Ferrite Image Waveguide (Letters), by T. Ohira, M. Tsutsumi, and N. Kumagai (Faculty of Engineering, Osaka University, Suita-shi, 565 Japan): *Trans. IECEJ*, vol. J65-B, pp. 819–820, June 1982.

The angle of the radiation beam can be shifted by 20 degrees by altering bias magnatic field at near 40 GHz. Experimental data are consistent with a second-order perturbation theory.

6

Numerical Analysis of Waveguide Cross-Sections Giving Minimum Attenuation Constants, by M. Suzuki (Furukawa Electric Co., Ichihara-shi, 290 Japan) and T. Hosono (Col-

lege of Science and Technology, Nihon University, Tokyo, 101 Japan): *Trans. IECEJ*, vol. J65-B, pp. 921–927, July 1982.

The finite element method and a quasi-Newton method are used to analyze the optimum configuration of cross-section. The obtained optimum configuration is an almost rectangular shape with round corners.

7

Input Reflection Coefficient of a Transmission Line with Two of the Same Discontinuities (Letters), by K. Nishio and H. Yabe (Junior Technical College of Electro-Communications, Chofu-shi, 1982 Japan): *Trans. IECEJ*, vol. J65-B, pp. 951–952, July 1982.

A formula of the reflection coefficient at each discontinuity of the line is derived from VSWR data at the input, and is experimentally confirmed.

8

Analysis of Enclosed Coupled-Coplanar Waveguides by Conformal Mapping Method (Letters), by Y. Noguchi and N. Okamoto (Faculty of Science and Technology, Kinki University, Higashi-Osaka-shi, 577 Japan): *Trans. IECEJ*, vol. J65-B, pp. 959–960, July 1982.

The characteristic impedance and the phase velocity of a coupled-coplanar waveguide enclosed by a rectangular conductor tube are calculated with conformal mapping.

9

Two-Dimensional Analysis of Microstrip Circuits and Antennae, by K. C. Gupta (Dept. of Electrical Engineering, Indian Institute of Technology, Kanpur, 208 016 India): *JIETE*, vol. 28, pp. 346–364, July 1982.

This article reviews methods and applications of two-dimensional analysis approach applicable to transmission structures, circuits, resonators, and antennae with one of the dimensions much smaller than the operating wavelength.

10

Transmission Characteristics of Bragg Waveguide (Letters), by S. Kuwano and K. Kokubun (College of Engineering, Nihon University, Koriyama-shi, 963 Japan): *Trans. IECEJ*, vol. J65-B, pp. 1068–1069, Aug. 1982.

A formula of transmission loss is derived and used to discuss the properties of leaky wave loss and material loss. It is shown that a low-loss Bragg Waveguide can be realized.

11

TE_{20}-TE_{10} Mode Conversion in Circularly Curved Rectangular Waveguides, by O. Wada, M. Nakajima, T. Yukawa and J. Ikenoue (Faculty of Engineering, Kyoto University, Kyoto-shi, 606 Japan): *Trans. IECEJ*, vol. J65-B, pp. 1164–1171, Sept. 1982.

Fields in a fan-shape circular *H*-bend are expanded in the mode functions of circular and rectangular waveguides. The results of a mode matching analysis show the maximum conversion efficiency of 94 percent.

12

An Analysis for Unbounded Regions of Shielded Strip Lines by Using a Boundary Element Method (Letters), by T. Honma and I. Fukai (Faculty of Engineering, Hokkaido University, Sapporo-shi, 060 Japan): *Trans. IECEJ*, vol. J65-B. pp. 1190–1191, Sept. 1982.

A fixed boundary with Neumann's condition and a pseudo-infinite boundary are approximately assumed in the analysis of shielded strip lines based on a boundary element method.

13

Behavior of Magnetostatic Wave Resonance in an Inhomogeneously Magnetized YIG Film (Letters), by M. Tsutsumi, K. Yabuta, and N. Kumagai (Faculty of Engineering, Osaka University, Suita-shi, 565 Japan): *Trans. IECEJ*, vol. J65-B, pp. 1192–1193, Sept. 1982.

Experimental results at *X*-band frequencies have shown the high *Q*-values of magnetostatic wave resonance over 2000.

14

GeO_2-ZnO-K_2O Glass as the Cladding Material of Hollow-Core Optical Waveguides for CO_2 Laser Light, by T. Hidaka, K. Kumada, T. Morikawa, and J. Shimada (Electrotechnical Lab., Ibaraki-ken, 305 Japan): *Trans. IECEJ*, vol. J65-C, pp. 689–696, Sept. 1982.

A hollow-core optical waveguide for CO_2 laser light was fabricated using GeO_2-ZnO-K_2O glass as the cladding material with the refractive index less than unity. Experimental results at 943 cm^{-1} are shown.

15

Analysis of the Ferrite Image Waveguides Using a Mode Matching Method, by Y. Yamanaka, K. Araki, and Y. Naito (Faculty of Engineering, Tokyo Institute of Technology, Tokyo, 152 Japan): *Trans. IECEJ*, vol. J65-B, pp. 1245–1252, Oct. 1982.

The complete mode set for a ferrite slab is used to represent the field of ferrite image lines in this analysis. The validity of the method is confirmed with experimental results on field distributions at *X*-band frequencies.

16

Improved Equivalent Network Analysis of a Dielectric Waveguide Placed on a Ground Plane, by M. Koshiba, H. Ishii, and M. Suzuki (Faculty of Engineering, Hokkaido University, Sapporo-shi, 060 Japan): *Trans. IECEJ*, vol. E65, pp. 572–578, Oct. 1982.

An improved network representation is derived for each part of the waveguide cross-section. These lumped networks are analyzed by using the Rayleigh–Ritz variational technique.

17

Tube-Contacted Slab Dielectric Waveguide for Millimeter Waves, by J. Gomi, T. Yoneyama, and S. Nishida (Research Institute of Electrical Communications, Tohoku University, Sendai-shi, 980 Japan): *Trans. IECEJ*, vol. J65-B, pp. 1340–1345, Nov. 1982.

This waveguide consists of a ground plane, a guiding layer on a substrate, and a contacting dielectric tube. The dispersion characteristics and field distributions of the guided modes are calculated based on the effective dielectric constant technique and compared with experimental results at 35 GHz.

18

Dielectric and Conductor Losses in Coplanar Waveguides, by K. Koshiji, E. Shu, and S. Miki (Faculty of Science and Technology, Science University of Tokyo, Noda-shi, 278 Japan): *Trans. IECEJ*, vol. J65-B, pp. 1499–1506, Dec. 1982.

The Laplace's equation is solved with the successive over relaxation method to evaluate the dielectric and conductor loss of coplanar waveguides. Theoretical results are compared with experimental results at 6.55 GHz.

19

Influence of Inner Conductor Offset in a Coplanar Waveguide (Letters), by K. Koshiji, E. Shu, and S. Miki (Faculty of Science and Technology, Science University of Tokyo, Noda-shi, 278 Japan): *Trans. IECEJ*, vol. J65-B, pp. 1563–1564, Dec. 1982.

The Laplace's equation is solved with the successive over-relaxation method to evaluate the dependence of inner conductor offset on the characteristic impedance of a coplanar waveguide. Experimental results at 6 GHz are shown.

20

An Analysis of TEM Cells by Using a Boundary Element Method (Letters), by T. Honma, Y. Takahashi, and I. Fukai (Faculty of Engineering, Hokkaido University, Sapporo-shi, 060 Japan): *Trans. IECEJ*, vol. J65-C, pp. 1001–1002, Dec. 1982.

A boundary element method is applied to the analysis of TEM cells. The characteristic impedance is estimated and compared with the results of an approximate analysis.

Microwave Integrated Circuits

1

Design Data on Inverted and Suspended Microstrip Lines for MIC Applications, by S. K. Koul and B. Bhat (Centre for Applied Research in Electronics, Indian Institute of Technology, Hauz Khas, New Delhi, 110 016, India): *JIETE*, vol. 28, pp. 313–317, July 1982.

A brief outline of the theoretical method for computing the characteristic impedance of the inverted microstrip and suspended microstrip lines, for MIC at frequencies above *X*-band, is reported.

2

A Comparative Investigation of Thick and Thin Film Microwave Integrated Circuits, by M. K. Bhatnagar (Central Electronics Engineering Research Institute, Pilani, 330 031 India), D. P. S. Seth (Telecommunication Research Centre, P&T Board, Khurshid Lal Bhawan, Janpath, New Delhi, 110 001 India), and G. P. Srivastava (Dept. of Physics and Astrophysics, University of Delhi, Delhi, 110 007 India): *JIETE*, vol. 28, pp. 318–323, July 1982.

An effort has been made to quantify the comparative performance from loss considerations as well as reliability of thin lines and fine gaps. This is achieved by studying resonators, parallel-coupled directional couplers, narrow bandpass filters, and power dividers, up to *X*-band.

3

Some Quality Control Studies in the Fabrication of MIC's (Letters), by B. K. Satyan, G. H. Sarma, T. S. Kalkoor, S. A. Mony, and A. N. A. Rao (Hybrid Microelectronics Lab., Indian Telephone Industries Lt., Bangalore, 560 016 India): *JIETE*, vol. 28, pp. 365–369, July 1982.

The performance of typical circuits like a 2 GHz-10 dB coupler and a 7 GHz-10 dB coupler/detector has been studied with variation of substrate thickness, line width, and gold plating thickness. This study has resulted in considerable improvement in the yield.

Microwave Field and Circuit Theory

1

Adaptation of Bergeron's Method to the Medium with Resonance Absorption (Letters), by N. Yoshida, I. Fukai, and J. Fukuoka (Faculty of Engineering, Hokkaido University, Sapporo-shi, 060 Japan): *Trans. IECEJ*, vol. J65-B, pp. 666–667, May. 1982.

This letter describes the application of the Bergeron's method to the transient analysis of electromagnetic fields in a medium with resonance absorption.

Microwave Antennas

1

Design of Circularly Polarized Printed Array Antennas Composed of Strips and Slots, by K. Ito and N. Goto (Faculty of Engineering, Tokyo Institute of Technology, Tokyo, 152 Japan): *Trans. IECEJ*, vol. J65-B, pp. 39–45, Jan. 1982.

A design method is proposed for expanding the bandwidth of an antenna composed of strips and slots. Experimental results on a 12-element antenna show the 3-dB bandwidth of 4.4 percent at 3 GHz.

2

Radiation Characteristics of Spherical Array Composed of Turnstile Antennas, by S. Horiguchi, T. Ishizone, and Y. Mushiake (Faculty of Engineering, Tohoku University, Sendai-shi, 980 Japan): *Trans. IECEJ*, vol. J65-B, pp. 46–53, Jan. 1982.

A hemispherical array of antennas has excellent characteristics as a circularly polarized radar antenna. The maximum directivity is obtained by solving the eigenvalue problem of a matrix composed of the self- and mutual-radiation resistance.

3

Self-Complementary Monopole-Notch Array Antennas, by

K. Yamamoto, K. Sawaya, T. Ishizone, and Y. Mushiake (Faculty of Engineering, Tohoku University, Sendai-shi, 980 Japan): *Trans. IECEJ*, vol. J65-B, pp. 70–77, Jan. 1982.

This paper experimentally examines the usefulness and limitation of the Mushiake's relation and the induced current method for analyzing the monopole-notch element located on an edge of a finite sheet.

4

Co-Planar, Dual Frequency, Back-Feed Type Circularly-Polarized Microstrip Antenna, by M. Haneishi, S. Yoshida (Faculty of Engineering, Saitama University, Urawa-shi, 338 Japan), and N. Goto (Faculty of Engineering, Tokyo Institute of Technology, Tokyo, 152 Japan): *Trans. IECEJ*, vol. J65-B, pp. 238–244, Feb. 1982.

This antenna is constructed with a pair of circularly polarized microstrip disk antennas, each with a different resonance frequency, and has the feature of small size, light weight, and low profile.

5

Axially Symmetric Equally Spaced Self-Complementary Array Antenna (Letters), by T. Kasahara (Sendai Radio Technical College, Miyagi-machi, 989-31 Japan) and Y. Mushiake (Faculty of Engineering, Tohoku University, Sendai-shi, 980 Japan): *Trans. IECEJ*, vol. J65-B, pp. 338–339, Mar. 1982.

The structure of antennas proposed here is simpler than that of conventional log-periodic arrays, but experimental results at 1–2 GHz show a feature of wide-bandwidth.

6

On Wire-Grid Method for Analysis of Wire Antenna near/on a Rectangular Conducting Body, by K. Hirasawa and K. Fujimoto (Institute of Applied Physics, University of Tsukuba, Ibaraki-ken, 305 Japan): *Trans. IECEJ*, vol. J65-B, pp. 382–389, Apr. 1982.

A loop and dipole antenna near a rectangular conducting box are approximately analyzed by replacing the conductor surface with wires. Numerical results are compared with experimental ones at 1 GHz.

7

On Setting-Up of the Standing Wave Detection Antenna at the Direct Measurement Method of Space Standing Waves at Oblique Incidence, by M. Ono, A. Takanashi, and T. Wagatsuma (Faculty of Engineering, Yamagata University, Yamagata-shi, 992 Japan): *Trans. IECEJ*, vol. J65-B, pp. 448–454, Apr. 1982.

The errors of measured reflection coefficients due to the tilt of the antenna can remain within ± 10 percent by setting the antenna perpendicular to the reflecting plane of an absorber sample.

8

Microstrip Antenna for Portable Radio in UHF Band (Letters), by J. Horikoshi, S. Watanabe, and T. Morinaga (Faculty of Engineering, Gunma University, Kiryu-shi, 376 Japan): *Trans. IECEJ*, vol. J65-B, pp. 505–506, Apr. 1982.

A microscrip antenna structure using epoxi-glass substrates with the thickness of 1/16 of an inch was investigated at 900 MHz. The impedance characteristics, radiation pattern, and human body effects are discussed.

9

Spherical Reflectors, by M. C. Chandra Mouly, (V. R. Siddhartha Engineering College, Vijayawada, India): *JIE*. (India), pt. ET-3, vol. 62, pp. 71–74, Apr. 1982.

The design equations for a spherical Cassegrainian system are developed based on ray optics. The equations for the caustics of concave and convex spherical reflectors are derived. Also, the equations of performance of the spherical Cassegrainian system are developed to assess the cross-polarization components introduced.

10

Far-Field Radiation Patterns of Spherical Subreflector, by M. C. Chandra Mouly (V. R. Siddhartha Engineering College, Vijayawada, India), *JIE*. (India), pt. ET-3, vol. 62, pp. 75–78, Apr. 1982.

Analysis of the far-field radiation patterns of a spherical subreflector based on the methods of physical optics and geometrical theory of diffraction is presented. Experimental results at 9 GHz are also included.

11

High Efficiency Dual-Mode Horn Antenna (Letters), by T. Ebisu and T. Katagi (Mitsubishi Electric Corp., Kamakura-shi, 247 Japan): *Trans. IECEJ*, vol. J65-B, pp. 664–665, may 1982.

The gain of a dual-mode horn antenna for satellite communication is maximized in a specified direction by varying the amplitude ratio and phase difference of the TE_{11} and TM_{11} mode at 6.4 GHz.

12

Radiation Characteristics of Reflector Antenna Consisting of Two Parabolic Cylinders, by M. Inagaki (Hamamatsu TV Co., Ltd., Hamamatsu-shi, 435 Japan), M. Uto (Nippon Telegraph and Telephone Public Corp., Tokyo 100 Japan), and K. Hongo (Faculty of Engineering, Shizuoka University, Hamamatsu-shi, 432 Japan): *Trans. IECEJ*, vol. J65-B, pp. 723–728, June 1982.

Radiation characteristics of a pencil-beam reflector antenna composed of two parabolic cylinders are studied theoretically and confirmed with experimental results at 10 GHz.

13

Low Sideband Offset Parabola Antenna, by Y. Yamada (Yokosuka Electrical Communication Lab., N.T.T., Yokosuka-shi, 238-03 Japan), Y. Sugita (Engineering Bureau, N.T.T., Tokyo, 100 Japan), T. Takano (Yokosuka Electrical Communication Lab., N.T.T., Yokosuka-shi, 238-03 Japan), and N. Kurashima (Mitsubishi Electric Corp., Kamakura-shi, 247 Japan): *Trans. IECEJ*, vol. J65-B, pp. 729–736, June 1982.

This paper describes the design procedure of an offset parabola antenna for terrestrial telecommunication systems, especially the design of the offset angle, the primary radiator characteristics, and feed angle. The results of the design show that all side lobe levels beyond 30° are lower than −20 dB.

14

Double Resonant Circular Microstrip Antenna for Mobile Radio Communications, by T. Taga (Yokosuka Electrical Communication Lab., N.T.T., Yokosuka-shi, 238-03 Japan): *Trans. IECEJ*, vol. J65-B, pp. 777–784, June 1982.

A double resonant circular microstrip antenna can be designed by adding small semicircular elements to the peripheral edge of a circular microstrip antenna. The second order perturbation theory of this antenna agrees well with experimental data at 4.5 GHz.

15

Four-Terminal Circularly Polarized Self-Complementary Antennas, by T. Kasahara (Sendai Radio Technical College, Miyagi-ken, 989-31 Japan) and Y. Mushiake (Faculty of Engineering, Tohoku University, Sendai-shi, 980 Japan): *Trans. IECEJ*, vol. J65-B, pp. 981–988, Aug. 1982.

This paper describes modified four-terminal planar self-complementary antennas which are located on pyramidal surfaces and applicable to satellite communication. Experimental results at 1–2 GHz are shown.

16

On the Obstacle to Radio Wave due to Snow Accretion on to Parabolic Antenna, by K. Hiruma, and A. Nishitsuji (Research Institute of Applied Electricity, Hokkaido University, Sapporo-shi, 060 Japan), Y. Otsu (Kashima Branch, Radio Research Lab., Ibaraki-ken, 314 Japan), H. Oyama, and Y. Yamazaki (Wakkanai Radio Wave Observatory, Radio Research Lab., Wakkanai-shi, 097 Japan): *Trans. IECEJ*, vol. J65-B, pp. 1021–1028, Aug. 1982.

The dielectric property of accreted snow is approximated by that of falling snow. Attenuation characteristics due to the accreted snow are estimated and compared with experimental results at 19 GHz.

17

Aperture Efficiency of A Square Corrugated Horn Antenna, by P. S. Bhatnagar and M. D. Singh (Central Electronics Engineering Research Institute, Pilani, India), and N. L. Narappanawar (Birla Institute of Technology and Science, Pilani, India): *JIE*. (India), pt. ET-1, vol. 63, pp. 43–45, Aug. 1982.

It has been found that proper corrugation enhances the aperture efficiency of square horn antennas.

18

Propagation Characteristics of Dielectric-Loaded Square Horn Antenna, by P. S. Bhatnagar and M. D. Singh (Central Electronics Engineering Research Institute, Pilani, Rajasthan, India): *JIE*. (India), pt. ET-1, vol. 63, pp. 46–48, Aug. 1982.

Phase characteristics of a square horn, having transverse dielectric loading on two walls, are presented. Theoretical results have been compared with some experimental data.

19

The Design and Radiation Characteristics of Dielectric-Loaded H-Plane Cosecant-Square-Beam Horn Antenna, by K. Sha, K. Sato, and M. Suzuki (Faculty of Engineering, Yamagata University, Yonezawa-shi, 992 Japan), and S. Adachi (Faculty of Engineering, Tohoku University, Sendai-shi, 980 Japan): *Trans. IECEJ*, vol. J65-B, pp. 1221–1228, Oct. 1982.

An H-plane cosecant-square-beam horn antenna of a non-planar aperture loaded with dielectric is designed based on ray theory. Experimental results at 24 GHz are also shown.

20

Gain of a Nonplanar Aperture-type E-Plane Sectoral Horn Antenna (Letters), by K. Sha, W. Nakata, and M. Suzuki (Faculty of Engineering, Yamagata University, Yonezawa-shi, 992 Japan), and S. Adachi (Faculty of Engineering, Tohoku University, Sendai-shi, 980 Japan): *Trans. IECEJ*, vol. J65-B, pp. 1306–1307, Oct. 1982.

General equations for the gain of a non-planar-aperture *E*-plane sectoral horn antenna are given and compared with experimental results at 24 GHz.

21

Microstrip Line Slot Array Antenna with Beam-Tilt Reduced, by K. Nakaoka and K. Itoh (Faculty of Engineering, Hokkaido University, Sapporo-shi, 060 Japan): *Trans. IECEJ*, vol. J65-B, pp. 1346–1352, Nov. 1982.

This antenna consists of the group of slots located along a microstrip line on the ground plane. The antenna designed with a waveguide array technique has shown the beam tilt less than 0.3° and the gain variation less than 1 dB at 11.5–12.2 GHz.

22

Several Aspects Related to the Realization of Annular Synthesis Telescope Operating at Millimeter Wavelengths, by N. Fourikis (School of Physics, The University of NSW, P.O. Box 1, Kensington, NSW 2033, Australia): *JEEE* (Australia), vol. 2, no. 4, pp. 193–201, Dec. 1982.

The geometric constraints related to annular synthesis telephones and other aspects related to their realization are reported. A large portion of this work is also applicable to multiple beam telescopes operating at millimeter wavelengths.

Microwave Propagation

1

Measurement of Depolarization due to Snowface at 34.5 GHz, by T. Ihara, Y. Furuhama, and K. Tohma (Radio Research Lab., Ministry of Post and Telecommunications, Koganei, 184 Japan): *Trans. IECEJ*, vol. E65, pp. 16–22, Jan. 1982.

A depolarization phenomenon of circularly polarized

waves at 34.5 GHz was observed on a horizontal terrestrial path of 1.3 Km, and used to explain the mechanism of a certain kind of anomalous depolarization on Earth-space paths.

2

Propagation Characteristics of the Dominant Mode in Tunnels, by Y. Yamaguchi and T. Abe (Faculty of Engineering, Niigata University, Niigata-shi, 950-21 Japan), and T. Sekiguchi (Faculty of Engineering, Tokyo Institute of Technology, Tokyo, 152 Japan): *Trans. IECEJ*, vol. J65-B, pp. 471–476, Apr. 1982.

It is shown by the numerical computation based on the point-matching method that the attenuation constants of the E_{11}^h and E_{11}^v mode are proportional to f^{-2}. Experimental results at 3–12 GHz are also shown.

3

Dependence of a Rain Scatter Influence on Polarizations and Positions of Terrestrial and Earth Stations, by S. Sakagami and Y. Hosoya (Yokosuka Electrical Communication Lab., N.T.T., Yokosuka-shi, 238-03 Japan): *Trans. IECEJ*, vol. J65-B, pp. 485–492, Apr. 1982.

This paper describes a method for calculating the reduction of the interference power due to the rain scattering for all combinations of polarizations at frequencies up to 50 GHz.

4

Rain Attenuation Consideration for Satellite Paths In Australia, by R. K. Flavin (Telecom Australia Research Lab.), *ATR*, vol. 16, no. 2, pp. 11–24, 1982.

A semi-empirical model for predicting earth-space path rain attenuation in Australia is presented. The model is based on many years of radiometer measurements at 11 and 14 GHz, and divides Australia into rain intensity zones.

5

Sodar Echoes and Line of Sight Microwave Propagation, by S. P. Singal, B. S. Gera, and A. B. Ghosh (National Physical Lab., New Delhi, India): *JIE*. (India), pt. ET-1, vol. 63, pp. 49–54, Aug. 1982.

The microwave communication characteristics have been found to have a correspondence with the sodar structures of the stable and unstable boundary layer, the stable boundary layer being responsible for most of the observed microwave fading characteristics.

Microwave Holography

1

Dependency of Imaging Characteristics on Reference's Phase in Radio-Frequency Holography (Letters) by Y. Ida, K. Hayashi, and K. Arai (Faculty of Technology, Kanazawa University, Kanazawa-shi, 920 Japan): *Trans. IECEJ*, vol. J65-C, pp. 582–583, July 1982.

The holographic imaging in the Fresnel zone provides potential applications to nondestructive testing. The effect of the phase of reference waves on imaging characteristics is experimentally investigated at 34 GHz.

Microwave Thermal Effects

1

Deep-Heating Technique for Hyperthermia, by Y. Amemiya and N. Terada (Faculty of Engineering, Nagoya University, Nagoya-shi, 464 Japan): *Trans. IECEJ*, vol. J65-B, pp. 78–85, Jan. 1982.

A circular array of radiators around a human body is proposed and analyzed as a new technique for the hyperthermic treatment of deep-seated tumor.

2

A 1–2-GHz Radiometer for Subcutaneous Tissue Temperature Measurements, by H. Harada, Y. Maeda, and S. Mizushina (Research Institute of Electronics, Shizuoka University, Hamamatsu-shi, 432 Japan): *Trans. IECEJ*, vol. J65-C, pp. 645–651, Aug. 1982.

The results of performance tests using a saline water (1-percent) tissue model have shown the temperature resolution of 0.06 K and the spatial resolution of 4 cm × 4 cm. A hot spot ($\Delta T \simeq 2$K) with 3-cm diameter at the depth of 3 cm from the surface was clearly identified.

3

Absorbed Power of Insect Exposed to Microwave Fields (Letters), by O. Fujiwara and Y. Amemiya (Faculty of Engineering, Nagoya University, Nagoya-shi, 464 Japan): *Trans. IECEJ*, vol. J65-B, pp. 1200–1201, Sept. 1982.

This letter describes a method to calculate the microwave power absorption by an insect by modeling it as a prolate spheroid exposed to standing wave fields in a waveguide. Experimental results on a Tenebrio pupa at 2.4 GHz are shown.

4

Lens Application for Localized Microwave Hyperthermia, by Y. Nikawa, T. Miyashita, and S. Mori (Faculty of Science and Technology, Keio University, Yokohama-shi, 223 Japan), M. Kikuchi, and T. Sekiya (Medical Engineering Dept., National Defence Medical College, Tokorozawa-shi, 359 Japan): *Trans. IECEJ*, vol. J65-B, pp. 1539–1546, Dec. 1982.

An analysis of electric fields due to the aperture of a lens applicator for localized microwave hyperthermia is presented. Theoretical results are consistent with experimental observations at 2.45 GHz.

Optical Fibers

1

Design and Characteristics of Standard Launching Fiber for Optical Loss Measurement, by M. Tokuda and T. Horiguchi (Ibaraki Electrical Communication Lab., N.T.T., Ibaraki-ken, 319-11 Japan), A. Ueki (Chiba Works, The Furukawa Electric Co., Ichihara-shi, 290 Japan), T. Oshima (Sumitomo Electric Industries Ltd., Yokohama-shi, 244 Japan), and M. Tanaka (The Fujikura Cable Works, Ltd., Sakura-shi, 285 Japan): *Trans. IECEJ*, vol. J65-B, pp. 145–152, Feb. 1982.

Standard excitation fibers with a small core diameter

were used to realize the steady-state distributions of modal power in the fiber to be measured. The measured optical loss of the standard fiber method agrees with those of the dummy fiber within ± 0.05 dB/Km.

2

Design Consideration on Single-Mode Optical Fiber Parameters, by M. Tateda, Y. Kato, S. Seikai, and N. Uchida (Ibaraki Electrical Communication Laboratory, N.T.T., Ibaraki-ken, 309-11 Japan): *Trans. IECEJ*, vol. J65-B, pp. 324–331, Mar. 1982.

The relative refractive index difference, core diameter, and effective cutoff wavelength of single-mode optical fibers are designed to minimize the total optical line loss between the light source and the detector at 1.3 μm.

3

Uniform Bending Losses of Single-Mode Fibers, by A. Kawana (Musashino Electrical Communication Lab., N.T.T., Musashino, 180 Japan), T. Hosaka and T. Miya (Ibaraki Electrical Communication Lab., N.T.T., Ibaraki, 319-11 Japan): *Trans. IECEJ*, vol. E65, pp. 331–336, June 1982.

The effects of a dip in the refractive-index distribution at the center of the fiber core, bending radius, and fiber parameters on bending losses were experimentally studied. An experimental equation for the bending loss is given.

4

Length Dependence of Bandwidth for Fibers with Small Axial Profile Fluctuations, by M. Miyamoto, R. Yamauchi, K. Inada (Telecommunication Research and Development Dept., The Fujikura Cable Works, Ltd., Sakura-shi, 285 Japan), and T. Tanifuji (Ibaraki Electrical Communication Lab., N.T.T., Ibaraki-ken, 319-11 Japan): *Trans. IECEJ*, vol. J65-B, pp. 1037–1043, Aug. 1982.

A long continuous fiber with an index profile varying in its axial direction at random is assumed. A simple analytical formula for the bandwidth of the fiber is derived based on a statistical approach.

5

Propagation Characteristics of Optical Fibers with Non-Ideal Index Profiles, by T. Hinata, H. Yoshikawa, and T. Hosono (College of Science and Technology, Nihon University, Tokyo, 101 Japan): *Trans. IECEJ*, vol. J65-C, pp. 637–644, Aug. 1982.

Step index profiles with a center dip and/or diffused core-cladding boundaries are investigated with a numerical analysis based on the stratified multilayer method.

6

Structural Parameter Specifications of a Graded-Index Fiber on the Basis of Splice Loss, by S. Seikai (Research and Development Bureau, N.T.T., Musashino, 180 Japan) and N. Uchida (Ibaraki Electrical Communication Lab., N.T.T., Ibaraki, 319-11 Japan): *Trans. IECEJ*, vol. E65, pp. 485–491, Aug. 1982.

Splice loss due to differences between fiber structural parameters such as outer diameter, core diameter, and refractive index is studied experimentally and theoretically. The splice loss of conventional graded-index fibers is estimated within an error of ± 0.1 dB.

7

Length Dependence of Baseband Bandwidth for Spliced Graded-Index Multimode Fibers, by T. Tanifuji, T. Horiguchi, and M. Tokuda (Ibaraki Electrical Communication Lab., N.T.T., Ibaraki-ken, 319-11 Japan): *Trans. IECEJ*, vol. J65-B, pp. 1275–1282, Oct. 1982.

The intermodal compensation of dispersion is the main factor when determining the length dependence of baseband bandwidth. A simple formula for the cumulative bandwidth is given.

8

Approximate Vector Analysis of Single-Mode Optical Fibers with Arbitrary Refractive Index Distribution, by M. Matsuhara (Faculty of Engineering, Osaka University, Suita-shi, 565 Japan): *Trans. IECEJ*, vol. J65-C, pp. 762–766, Oct. 1982.

The propagation constant is approximately analyzed based on the variational expression given by Berk. The accuracy of the propagation constants with this method is investigated for two cases of the refractive index distribution.

9

Polarization and Transmission Characteristics of a Symmetrically Loaded Single-Mode Optical Fiber and a Proposal of Polarization-Maintaining Fiber Holder, by K. Kusano (Research Institute of Electrical Communication, Tohoku University, Sendai-shi, 980 Japan): *Trans. IECEJ*, vol. J65-C, pp. 775–782, Oct. 1982.

This paper describes the polarization and transmission properties of a single-mode optical fiber with the inner stresses distributed symmetrically in the fiber cross section and partially along the fiber axis, and proposes some fiber holders.

10

An Exact Analysis of Group Velocity for Propagation Modes in Optical Fibers, by K. Morishita (Faculty of Engineering, Osaka Electro-Communication University, Neyagawa-shi, 572 Japan), Y. Obata, and N. Kumagai (Faculty of Engineering, Osaka University, Suita-shi, 565 Japan): *Trans. IECEJ*, vol. J65-C, pp. 822–828, Oct. 1982.

The group velocity of propagation modes are determined by using the vector multilayer approximation and an integral expression for the group velocity. This method is compared with the scalar approximation analysis.

11

Proposal of Linearly Polarized Wave Transmission System Using a Twisted Optical Fiber (Letters), by K. Kusano (Research Institute of Electrical Communication, Tohoku University, Sendai-shi, 980 Japan): *Trans. IECEJ*, vol. J65-B, pp. 1441–1442, Nov. 1982.

A system for transmitting linearly polarized waves using a twisted optical fiber is proposed based on the investigation on the effect of anisotropy and twist.

12

Stress and Relative Dielectric Tensor Distributions in a Symmetrically Loaded Optical Fiber, by K. Kusano (Research Institute of Electrical Communications, Tohoku University Sendai-shi, 980 Japan): *Trans. IECEJ*, vol. J65-C, pp. 845–851, Nov. 1982.

Stress distribution in a circular-core fiber is estimated for the case where a mechanical load is applied symmetrically around the fiber surface and partially along the fiber axis. The change of the dielectric tensor induced by the stress is also analyzed.

13

Polarization Preservation in Long-Length Twisted Single-Mode Optical Fibers, by S. Machida, J. Sakai, and T. Kimura (Musashino Electrical Communication Lab., N.T.T., Musashino, 180 Japan): *Trans. IECEJ*, vol. E65, pp. 642–648, Nov. 1982.

Effects of the twist and core ellipticity on the polarization characteristics of single mode optical fibers are studied experimentally and theoretically to design a stable twisted fiber with a high degree of polarization.

Optical Waveguides Other Than Fibers

1

On the Leaky-Wave Stopband of a Periodically Corrugated Image Line, by T. Ohira, M. Ishiguro, M. Tsutsumi, and N. Kumagai (Faculty of Engineering, Osaka University, Suita-shi, 565 Japan): *Trans. IECEJ*, vol. J65-B, pp. 253–260, Feb. 1982.

Coupled-mode equations for the second-order Bragg interactions are investigated. The behavior of electromagnetic wave interactions in the leaky-wave stopband is investigated by using the high-order boundary perturbation procedure. The reflection, transmission, and radiation coefficients are estimated numerically.

2

Analysis of the First-Order Bragg Interactions in an Asymmetric Dielectric-Slab Waveguide with a Periodic Surface Corrugation (Letters), by K. Yasumoto (Faculty of Engineering, Kyushu University, Fukuoka-shi, 812 Japan): *Trans. IECEJ*, vol. J65-B, pp. 261–262, Feb. 1982.

Coupled-mode equations for the symmetrical first-order Bragg interactions in an asymmetric dielectric-slab waveguide with weak sinusoidal corrugation are derived for both TE and TM modes.

3

Fluctuation and Scattering Properties of RF Sputtered Glass Thin Film Optical Waveguides, by M. Imai (Faculty of Engineering, Hokkaido University), M. Koseki (Totsuka Works, Hitachi Ltd., Yokohama-shi, 244 Japan), and Y. Ohtsuka (Faculty of Engineering, Hokkaido University): *Trans. IECEJ*, vol. J65-C, pp. 80–87, Feb. 1982.

The measured values of the scattered light intensity are consistent with theoretical values when waveguide imperfections due to irregular boundaries and inhomogeneities are considered.

4

Scattering Mode Conversion of Guided Modes in an Optical Slab Waveguide Caused by a Cylindrical Obstacle of Arbitrary Cross Section Shape, by T. Nobuyoshi, N. Morita, and N. Kumagai (Faculty of Engineering, Osaka University, Suita-shi, 565 Japan): *Trans. IECEJ*, vol. J65-C, pp. 88–95, Feb. 1982.

The equivalent electric and magnetic currents at the surface of the scatterer are evaluated theoretically with the surface integral equation technique to obtain the mode conversion coefficients and scattering power patterns.

5

Optical Guided-Wave Dye Laser and Directional Coupling Amplifier, by O. Hamano and K. Sasaki (Faculty of Science and Technology, Keio University, Yokohama-shi, 223 Japan): *Trans. IECEJ*, vol. J65-C, pp. 193–198, Mar. 1982.

Super radiant laser light produced by organic dye in a polymer top layer of a slab-type optical waveguide is evanescently coupled into a main waveguide. An optical directional coupling amplifier is described as an application of this structure.

6

Analysis of Discontinuities in Dielectric Slab Waveguide by Means of the Induced Dipole Method, by Y. Hayashi, T. Kitazawa (Faculty of Engineering, Kitami Institute of Technology, Kitami-shi, 090 Japan), and M. Suzuki (Faculty of Engineering, Hokkaido University, Sapporo-shi, 060 Japan): *Trans. IECEJ*, vol. J65-B, pp. 829–835, July 1982.

The reflection and transmission coefficient of a groove and rib in a dielectric slab are evaluated with the induced dipole method. The numerical results by this method agree with those by the finite element method.

8

Theoretical Treatment of Arbitrarily Shaped Cut-Ends of Dielectric Optical Waveguide, by E. Nishimura, N. Morita, and N. Kumagai (Faculty of Engineering, Osaka University, Suita-shi, 565 Japan): *Trans. IECEJ*, vol. J65-C, pp. 537–544, July 1982.

Integral equations for tangential electromagnetic fields in the cross-section of a cut-end are iteratively solved. Scattering patterns, and reflected and transmitted power, are calculated numerically for several cut-end shapes.

9

A Study of Twin-Waveguide Systems for Efficient Surface Wave Excitation, by H. Kitajima (Faculty of Engineering, Kyushu Institute of Technology, Kitakyushu-shi, 804 Japan): *Trans. IECEJ*, vol. J65-C, pp. 591–598, Aug. 1982.

The phase velocities of the even and odd modes in a twin-waveguide coincide when the fields of these modes leak into the external prism region. When the degenerated coupled modes are excited with a Gaussian beam through the prism region, a large Goos–Haenchen shift is produced.

10

Polymer Thin Film Optical Waveguide, by I. Kato, M.

Komatsu, S. Kawamoto, and Y. Matsumoto (School of Science and Engineering, Waseda University, Tokyo, 160 Japan): *Trans. IECEJ*, vol. J65-C, pp. 860–866, Nov. 1982.

This paper describes thin film waveguides with low propagation loss fabricated by a photo-locking process. The change of the refractive index is higher than 2 percent in this process.

Optical Devices

1

Two-Dimensional Walsh Transforming Device Using an Integrated Optical Circuit (Letters), by I. Fukui (Mechanical Engineering Lab., Ibaraki, 305 Japan): *Trans. IECEJ*, vol. E65, pp. 61–62, Jan. 1982.

A new device for the two-dimensional Walsh transform using light waveguides and electronic circuits is proposed. This device can replace wiring lines and adder circuit parts with a crossing point of two waveguides.

2

Quantum Intensity Noise of Directly Modulated Laser Diode Influenced by Reflected Waves, by O. Hirota and Y. Suematsu (Faculty of Engineering, Tokyo Institute of Technology, Tokyo, 152 Japan): *Trans. IECEJ*, vol. E65, pp. 94–101, Feb. 1982.

The enhancement effect of quantum noise due to the direct modulation of laser diodes is described in terms of the quantum shot noise and modulation currents. The high-frequency intensity noise due to reflected waves is also discussed.

3

Semiconductor Laser Module for Single-Mode Fiber Transmission System Using a Combination of Confocal Two Lenses, by T. Sugie and M. Saruwatari (Yokosuka Electrical Communication Lab., N.T.T., Yokosuka-shi, 238-03 Japan): *Trans. IECEJ*, vol. J65-B, pp. 374–381, Apr. 1982.

The optimum design method and misalignment tolerance of a two-lens confocal system are discussed for the purpose of coupling. Coupling modules using this system were easily fabricated, and showed the coupling efficiency of 48 percent.

4

Analysis and Experiments for the Operation of Hybrid Astable Optical Multivibrator (Letters), by S. Iwamoto, Y. Iida, and M. Morita (Faculty of Engineering, Kansai University, Suita-shi, 564 Japan): *Trans. IECEJ*, vol. J65-C, pp. 674–675, Aug. 1982.

A hybrid astable optical multivibrator is proposed by which two output light signals of square wave form can be obtained with the reverse polarity.

5

Thin-Film Fresnel Light Modulators, by K. Takizawa (NHK Broadcasting Science Research Lab., Tokyo, 157 Japan): *Trans. IECEJ*, vol. J65-C, pp. 697–704, Sept. 1982.

This paper describes the one-dimensional focusing and modulation of He-Ne laser light using a Fresnel lens consisting of channel waveguides and slab waveguides on $LiNbO_3$ substrates. Experimental results show the half-wavelength voltage of 28 V and the extinction ratio of 18.1 dB.

6

A Study of Reflected Light Effects on the Modulation Characteristics of Semiconductor Laser Module for Single-Mode Fiber Transmission, by T. Sugie and M. Saruwatari (Yokosuka Electrical Communication Lab., N.T.T., Yokosuka-shi, 238 Japan): *Trans. IECEJ*, vol. J65-B, pp. 1298–1305, Oct. 1982.

The temperature dependence of modulation characteristics, the output from a fiber, and the spectrum of a laser module are analyzed based on a composite cavity model formed by laser and fiber face.

7

Phase Compensation Film for Planar Optical Devices, by M. Shirasaki, Y. Daido, and K. Asama (Fujitsu Lab., Ltd., Kawasaki-shi, 211 Japan): *Trans. IECEJ*, vol. J65-C, pp. 814–821, Oct. 1982.

This paper describes a method to eliminate the phase velocity difference between the TE and TM mode in a planar polarization converter by applying optical interference films on the surface of the converter.

8

Mixing Efficiency of Multimode Fiber-Optic Interferometer, by M. Imai (Faculty of Engineering, Hokkaido University, Sapporo-shi, 060 Japan), T. Ohashi (Sakura Works, The Fujikura Cable Works Ltd., Sakura-shi 285 Japan), and Y. Ohtsuka (Faculty of Engineering, Hokkaido University): *Trans. IECEJ*, vol. J65-C, pp. 985–990, Dec. 1982.

A fiber-optic Michelson interferometer has been developed to measure vibrational displacements. The mixing efficiency is obtained as a function of the aperture radius of a photodetector.

9

A Fabry-Perot Type CdTe Light Modulator at 10.6 μm (Letters), by T. Matsushima, M. Tamura, and T. Sueta (Faculty of Engineering Science, Osaka University, Toyonaka-shi, 560 Japan): *Trans. IECEJ*, vol. J65-C, pp. 999–1000, Dec. 1982.

A high-sensitivity 10.6-μm light-modulator was constructed making use of the Fabry–Perot-type operation. The low modulation voltage of 63 V rms was obtained for the 50-percent intensity modulation and the bandwidth of 18 MHz.

Measurements

1

A Microwave Method for Measuring the Small Movement of Biological Subjects, by I. Arai and T. Suzuki (Dept. of

Applied Electronics, University of Electro-Communications, Chofu-shi, 182 Japan): *Trans. IECEJ*, vol. J65-C, pp. 177–184, Mar. 1982.

A new sensor for measuring the small movement of a biological subject is developed based on the principle of a microwave interferometer and signal processing techniques at 10.525 GHz.

2

Absorber Testing Method for the Oblique Incidence (Letters), by S. Ugai (Faculty of Science and Technology, Sophia University, Tokyo, 102 Japan) and K. Shimada (Faculty of Engineering, University of Tokyo, 153 Japan): *Trans. IECEJ*, vol. J65-B, pp. 501–502, Apr. 1982.

A new method for measuring the characteristics of absorbers over a wide range of incident angles is proposed and experimental results at 50 GHz and 10 GHz are described.

3

Optical Time Domain Reflectometer for Backscattered Light, by M. Nakahira (Musashino Electrical Communication Lab., N.T.T., Musashino-shi, 180 Japan), M. Tokuda and K. Omote (Ibaraki Electrical Communication Lab., N.T.T., Ibaraki-ken, 319-11 Japan), T. Kosugi and K. Kitagawa (Anritsu Electric Co., Ltd., Atsugi-shi, 243 Japan): *Trans. IECEJ*, vol. J65-B, pp. 515–522, May 1982.

This paper describes the design and construction of an optical time domain reflectometer to be used for the diagnosis of fiber break and for the measurement of losses in multimode fibers with the backward Reyleigh scattering.

4

A Method for Measuring Amplitude and Phase of Each Radiating Element of a Phased Array Antenna, by S. Mano and T. Katagi (Information Systems and Electronics Development Lab., Mitsubishi Electric Corp., Kamakura-shi, 247 Japan): *Trans. IECEJ*, vol. J65-B, pp. 555–560, May 1982.

The total electric field due to a phased array is measured by varying the phase of each radiating element to identify the amplitude and phase of the element. Experimental results at 10 GHz are shown.

5

Design and Characteristics of the SGS Exciter for the Transmission Bandwidth Measurement of Graded-Index Fibers, by M. Tokuda, T. Horiguchi, and T. Tanifuji (Ibaraki Electrical Communication Lab., N.T.T., Ibaraki-ken, 319-11 Japan): *Trans. IECEJ*, vol. J65-B, pp. 585–592, May 1982.

This paper describes the design and characteristics of the SGS exciter, composed of step-, graded-, and step-index fibers of short length spliced in tandem, for the measurement of the transmission bandwidth of graded-index fibers.

6

Design and Experiment of the Absorber Embedding Foamed Polystyrene in Pyramid Gaps (Letters), by M. Ono, Y. Sugai, and T. Shibuya (Faculty of Engineering, Yamagata University, Yonezawa-shi, 992 Japan): *Trans. IECEJ*, vol. J65-B, pp. 670–671, May 1982.

Pyramidal absorbers, whose gaps are filled with foamed polystyrene, are designed as the flooring material with low reflection coefficient for normal and oblique incidence.

7

Measurements of Millimeter Wave Reflection Coefficients Over Wide Frequency Range by Using a Spacial T-Junction, by T. Iwasaki and A. Nagatsuka (Electrotechnical Lab., Ibaraki-ken, 305 Japan): *Trans. IECEJ*, vol. J65-B, pp. 1215–1220, Oct. 1982.

A method for measuring reflection coefficients without tuning procedure over a wide frequency range is presented. The reflection coefficients of a bolometer mount have been measured by this method at 29–39 GHz.

8

Measurement of a Near-Field Distribution Around Slanted End of a Rectangular Dielectric Waveguide (Letters), by K. Matsumura and H. Kawamura (Faculty of Engineering, Utsunomiya University, Utsunomiya-shi, 321 Japan): *Trans. IECEJ*, vol. J65-B, pp. 1316-1317, Oct. 1982.

The results of the measurements show that the main part of foregoing waves are deflected at the slanted end and waves reflected at the end make an unsymmetrical field distribution around the waveguide.