

# Microwave Abstracts

Based on technical merit and timeliness, microwave papers in journals published outside the United States have been selected and compiled below, many with annotations. Reprints of the papers may be obtained by writing directly to the author or to the source quoted. The papers are in English unless noted otherwise.

—F. G. R. Warren, *Associate Editor for Abstracts*  
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## PAPERS FROM JOURNALS PUBLISHED IN JAPAN

Compiled by Prof. H. Iwakata, Waseda University, Tokyo, Japan and his committee.<sup>1</sup>

80

Investigation on the Validity of Probe Measurement of Plasma in a Magnetic Field with a Microwave Interferometer, by U. Kubo and Y. Inuishi (Faculty of Engrg., Osaka Univ., Osaka); *J. Inst. Elec. Engrs. Japan*, vol. 86, no. 928, pp. 115-123, January 1966.

Discussion of probe method and microwave method, and results from their analysis. (In Japanese.)

81

Influence of Moving Striation on Microwave Reflection from Plasma, by K. Terayama and T. Takamoto (Faculty of Engrg., Kansai Univ., Kyoto); *J. Inst. Elec. Engrs. Japan*, vol. 86, no. 929, pp. 281-288, February 1966.

Experimental studies and analysis of their results. (In Japanese.)

82

Electron Density Distribution Effects in Isotropic Plasma Waveguides, by M. Ohkubo (Faculty of Engrg., Gunma Univ., Kiryu, Gunma); *J. Inst. Elec. Engrs. Japan*, vol. 86, no. 932, pp. 776-780, May 1966.

Theoretical analysis of a circular waveguide filled with plasma whose density variation is parabolic with radius. (In Japanese.)

83

Synthesis of a Multi-Layer Absorbing Wall for Microwaves, by Y. Naito and K. Suetake (Tokyo Inst. Tech., Tokyo); *J. Inst. Elec. Commun. Engrs. Japan*, vol. 48, pp. 2151-2160, December 1965.

A new design method for a multi-layer absorbing wall at microwaves applying the concept of impedance matching. The practical results are shown. (In Japanese.)

84

The Blocking Effect in a Parametric Amplifier, by K. Nosaka and M. Yamaguchi (Kokusai Denshin Denwa Co., Ltd., Tokyo); *J. Inst. Elec. Commun. Engrs. Japan*, vol. 49, pp. 212-219, February 1966.

Analysis of the blocking effect in a parametric amplifier under the influence of an undesired signal. Experimental results are

<sup>1</sup> T. Iijima, Y. Kasai, T. Nakahara, B. Oguchi, S. Okamura, T. Sekiguchi, K. Suetake, and A. Uchiyama.

given and compared with analysis. (In Japanese.)

85

Mode Discrimination in a Laser Resonator Exploiting the Transmission Characteristics of a Fabry-Perot Interferometer, by N. Kumagai and M. Matsubara (School of Engrg., Osaka Univ., Osaka); *J. Inst. Elec. Commun. Engrs. Japan*, vol. 49, pp. 244-248, February 1966.

Analysis of mode discrimination by means of a slightly tilted Fabry-Perot interferometer placed within a laser resonator, and notes on design. (In Japanese.)

86

Analysis of a Multiplier with Varactor Diodes, Especially Concerning Maximum Conversion Power, by K. Yamazaki (Fujitsu Labs., Kawasaki, Kanagawa); *J. Inst. Elec. Commun. Engrs. Japan*, vol. 49, pp. 257-263, February 1966.

Analysis and experimental results. (In Japanese.)

87

On Second Harmonic Generation in a Three-Level System Using Nonlinear Quantum Effects, by F. Inaba and H. Morita (Research Inst. Elec. Commun., Tohoku Univ., Sendai); *J. Inst. Elec. Comm. Engrs. Japan*, vol. 49, pp. 371-379, March 1966.

Theoretical analysis by the method of density matrix in quantum mechanics. (In Japanese.)

88

Experiments on Radar Transmitting Peak Power Amplification by the Platinotron, by F. Yamagishi and A. Komata (Research and Development Inst., Japan Defence Agency, Tokyo Air Staff Office, Japan Air Self Defence Force, Defence Agency, Tokyo); *J. Inst. Elec. Commun. Engrs. Japan*, vol. 49, pp. 388-400, March 1966.

Reports on experimental results. (In Japanese.)

89

A Location Invariant Method for Measuring Dielectric Constants at Microwave Frequencies, by O. Fukumitsu (Faculty of Engrg., Kyushu Univ., Fukuoka); *J. Inst. Elec. Commun. Engrs. Japan*, vol. 49, pp. 425-431, March 1966.

A new method for measuring dielectric constant by a reflection method is proposed and practical procedures are given. (In Japanese.)

90

Calculation of Attenuation Constant of Model Helix Waveguide, by T. Hosono, S. Yoshida, and T. Namiki (Nippon Univ., Tokyo; The Furukawa Electric Co., Ltd., Yokohama); *J. Inst. Elec. Commun. Engrs. Japan*, vol. 49, pp. 432-438, March 1966.

Calculation of  $TE_{01}$  mode attenuation constant considering the dielectric properties of insulators for helix conductors. (In Japanese.)

91

Wide-Band Quasi-Optic Prism Components, by T. Sueta, N. Kumagai and S. Kurazono (Faculty of Engrg. Sci., Faculty of Engrg., Osaka Univ., Osaka); *J. Inst. Elec. Commun. Engrs. Japan*, vol. 49, pp. 457-462, March 1966.

Proposal of wide-band quasi-optic directional coupler, attenuator, and magic T using a dielectric prism, and their analysis. (In Japanese.)

92

Light Beam Waveguide Using Lens Like Media with Periodic Hyperbolic Temperature Distribution, by Y. Suematsu (Tokyo Inst. Tech., Tokyo); *J. Inst. Elec. Commun. Engrs. Japan*, vol. 49, pp. 463-469, March 1966.

A new light beam waveguide is proposed and its construction and transmission conditions are discussed. (In Japanese.)

93

Consideration of Error Rate and Transmitting Power in Microwave PCM Systems, by Y. Mori and K. Miyauchi (Elec. Commun. Lab., Tokyo); *J. Inst. Elec. Commun. Engrs. Japan*, vol. 49, pp. 470-475, March 1966.

Theoretical analysis. (In Japanese.)

94

A Theory and a Model Experiment on Radio Propagation in a Medium of which Permittivity Varies Bilinearly with Distance, by S. Kozaki, S. Adachi, and Y. Mushiaki (Faculty of Engrg., Tohoku Univ., Sendai); *J. Inst. Elec. Commun. Engrs. Japan*, vol. 49, pp. 709-716, April 1966.

Strict analysis of electromagnetic waves in an inhomogeneous medium and model experiments. (In Japanese.)

95

Theory of the Segmented Laser, by N. Kumagai and T. Uegaki (Dept. of Elec. Commun. Engrs., School of Engrg., Osaka

Univ., Osaka); *J. Inst. Elec. Commun. Engrs. Japan*, vol. 49, pp. 717-721, April 1966.

Theoretical analysis of oscillation characteristics of two-segment laser and comparisons with experiments. (In Japanese.)

96

Propagation Characteristics in Waveguide Loaded with a Cylindrical Semiconductor Rod, by T. Arizumi and M. Umeno (Dept. of Electronics, Faculty of Engrg., Nagoya Univ., Nagoya); *J. Inst. Elec. Commun. Engrs. Japan*, vol. 49, pp. 722-729, April 1966.

Theoretical analysis and experiments. (In Japanese.)

97

Optoelectronic Unilateral Semiconductor Transformer, by T. Nakano, F. Kitasawa, T. Sasaki, and J. Nishizawa (Research Inst. Elec. Commun., Tohoku Univ., Sendai); *J. Inst. Elec. Commun. Engrs. Japan*, vol. 49, pp. 738-747, April 1966.

Studies of realization of optoelectronic unilateral transformer using combination of GaAs EL or laser diode and Si pin photodiode. (In Japanese.)

98

Convergency of Flow-Type Gas Lens, by Y. Suematsu, K. Iga, and Y. Fukinuki, (Tokyo Inst. Tech., Tokyo); *J. Inst. Elec. Commun. Engrs. Japan*, vol. 49, pp. 748-754, April 1966.

Analysis of converging response of flow-type gas lens for Gaussian light beam using a new matrix concept and comparisons with experiments. (In Japanese.)

99

Analysis of a Wide-Band Frequency Sweep Control System for the BWO, by M. Hata (Oki Electric Industrial Co., Ltd., Tokyo); *J. Inst. Elec. Commun. Engrs. Japan*, vol. 49, pp. 891-898, May 1966.

Theoretical analysis and synthesis of the performance of a wide-band frequency sweep control system for the BWO. (In Japanese.)

100

Experiments on Wide-Band Frequency Sweep Control for the Millimeter Wave BWO, by M. Hata (Oki Electric Industrial Co., Ltd., Tokyo); *J. Inst. Elec. Commun. Engrs. Japan*, vol. 49, pp. 899-905, May 1966.

Circuit configurations of the control system and practical synthesis at 35 GHz are discussed. (In Japanese.)

101

Unwanted Mode Propagation in Helix Waveguide, by S. Yoshida (Furukawa Electric Co., Ltd., Yokohama); *J. Inst. Elec. Commun. Engrs. Japan*, vol. 49, pp. 943-948, May 1966.

Theoretical analysis and numerical computations. (In Japanese.)

102

Some Consideration of the Semiconductor Junction Laser by Electro-Magnetic Wave Theory, by Y. Suematsu and T. Ikegami, (Tokyo Inst. Tech. Tokyo); *J. Inst. Elec. Commun. Engrs. Japan*, vol. 49, pp. 1091-1098, June 1966.

Numerical analysis of the semiconductor junction laser by the electromagnetic wave model of McWhorter and its useful data are shown. (In Japanese.)

103

The Reflecting Beam Waveguide, by N. Kumagai, K. Yoshida, and T. Nakahara, (College of Engrg., Osaka Univ., Osaka; Sumitomo Electric Industries, Ltd., Osaka); *J. Inst. Elec. Commun. Engrs. Japan*, vol. 49, pp. 1099-1106, June 1966.

Theoretical analysis of beam waveguide using reflectors as phase compensators. (In Japanese.)

104

Some Notes on the Open Type Waveguide and the Kirchhoff-Huygens Principle, by S. Iiguchi (Inst. Space and Aeronautical Sci., Univ. of Tokyo, Tokyo); *J. Inst. Elec. Commun. Engrs. Japan*, vol. 49, pp. 1114-1120, June 1966.

Theoretical discussion. (In Japanese.)

105

Wafer-Type Millimeter Wave Diodes, by T. Okabe, K. Yokoo, and M. Shinmen, Dept. of Electronics, Faculty of Engrg., Shizuoka Univ., Hamamatsu); *J. Inst. Elec. Commun. Engrs. Japan*, vol. 49, pp. 1121-1126, June 1966.

Practical development of point contact wafer-type diodes by an improvement of its construction and particular treatment of Si and Ge. Characteristics of trial diodes are shown. (In Japanese.)

106

On the Disturbed Electromagnetic Fields by a Slot Made on the Cylindrical Structure, by K. Ito, M. Okamoto, M. Suzuki, and M. Matsumoto (Faculty of Engrg., Hokkaido Univ., Sapporo; Mitsubishi Electric Corp., Amagasaki, Osaka); *J. Inst. Elec. Commun. Engrs. Japan*, vol. 49, pp. 1127-1133, June 1966.

Propagation constant of leaky wave for  $H_{11}$  mode of an axially slotted coaxial waveguide and a new experimental result are discussed. (In Japanese.)

107

A New Type of Wide-Band Microwave Oscillator "Fawshmotron,"<sup>2</sup> by Y. Matsuo, K. Ebistani and A. Kusunoki (Inst. of Scientific and Industrial Research, Osaka Univ., Sakai, Osaka); *J. Inst. Elec. Commun. Engrs. Japan*, vol. 49, pp. 1134-1138, June 1966.

Analysis and experimental results of a new wide-band microwave tube (28 GHz to 38 GHz) by the interaction of fast wave simple harmonic motion of electron and transmission line without retarding circuit. (In Japanese.)

108

Electromagnetic Radiation from an Electric Dipole Moving with Relativistic Velocity, by H. Fujioka, T. Shiozawa, and N. Kumagai, (School of Engrg., Osaka Univ., Osaka); *J. Inst. Elec. Commun. Engrs. Japan*, vol. 49, pp. 1147-1152, June 1966.

Theoretical analysis and numerical results of radiation field, energy density, radiation power, gain function, and Doppler

effect of receiving frequency by Lorentz transformation. (In Japanese.)

109

A Class of Cylindrical Fabry-Perot Resonators, by N. Kumagai, H. Mori, and K. Yoshida (School of Engrg., Osaka Univ., Osaka); *J. Inst. Elec. Commun. Engrs. Japan*, vol. 49, pp. 1160-1165, June 1966.

Theoretical analysis of a cylindrical Fabry-Perot resonator on its axis of symmetry. (In Japanese.)

110

On Transmission Characteristics of Rectangular Waveguides Filled with Inhomogeneous Media Composed of Dielectrics and Metallic Blades, by S. Nishida and T. Nagao (Research Inst. Elec. Commun., Tohoku Univ., Sendai Defence Acad., Yokosuda); *J. Inst. Elec. Commun. Engrs. Japan*, vol. 49, pp. 1173-1181, June 1966.

Theoretical analysis. (In Japanese.)

111

Temperature Dependence of the Characteristics of the Cross Relaxation Rutile Maser, by R. Hayashi (The Radio Research Labs., Kokubunji, Tokyo); *J. Radio Research Labs.*, vol. 12, No. 64, pp. 381-392, November 1965.

Shifts of paramagnetic resonance spectra by temperature change are observed on the crystal of  $TiO_2$  doped with  $Cr^{3+}$ . Inversion ratio is examined as the function of separation of crossing spectra and the deviation angle for the cross-relaxation maser with different temperatures. The temperature dependence of pumping power and the desirable orientation are also discussed. (In Japanese.)

112

A Project of Multiple-Element Swept-Lobe Interferometer for the Study of Solar Radio Bursts, by H. Tanaka (The Research Inst. Atmospherics, Nagoya Univ., Toyokawa, Aichi Prefecture); *Proc. Research Inst. Atmospherics, Nagoya Univ.*, vol. 13, pp. 49-57, January 1966.

Desirable characteristics of an interferometer for the study of solar radio bursts are discussed, and the possibility of realizing a quick scanning interferometer is considered. (In Japanese.)

113

Preliminary Result of Absolute Calibration of Solar Radio Flux Density in the Microwave Region, by H. Tanaka and T. Kakinuma (The Research Institute of Atmospherics, Nagoya Univ., Toyokawa, Aichi Prefecture); *Proc. Research Inst. Atmospherics, Nagoya Univ.*, vol. 13, pp. 41-47, January 1966.

Absolute calibration of solar radio flux density at 1000, 2000, and 3750 MHz was made. (In Japanese.)

114

Resonant Slot-Type Mode Filter for Multi-mode Waveguides in the Millimeter Wave Region, by S. Shimada (The Hitachi Central Research Lab., Tokyo); *The Hitachi Hyoron*, vol. 47, pp. 1910-1915, December 1965.

Theory and experiment at 50 GHz. (In Japanese.)

<sup>2</sup> Fast Wave Simple Harmonic Motion.

115

**Radiation and Coupling in the Leaky Waveguide Communication System—An Application of Grooved Guide**, by S. Tomita, T. Nakahara, N. Kurauchi, and Nagao (Railway Tech. Research Inst. of Japanese Nat'l Railways, Tokyo; Sumitomo Electric Industries Ltd., Osaka); *The Sumitomo Elec. Rev.*, vol. 90, pp. 88-101, October 1965.

Problems on application of grooved guide to train communication are discussed. (In Japanese, English summary.)

116

**Switching Characteristics of Microwave Diode Switches**, by K. Miyauchi, R. Yamamoto, and O. Ueda, (Elec. Commun. Lab., Nippon Telegraph & Telephone Public Corp., Musashino-shi, Tokyo); *Elec. Commun. Lab. Tech. J.*, vol. 14, pp. 2319-2373, November 1965.

Transient characteristics of a variable capacitance diode switch are theoretically analyzed, and transient responses are investigated experimentally in the frequency region of 11 GHz. (In Japanese.)

117

**Experiments on High Speed Pulse Regeneration in 11 GHz Region**, by K. Miyauchi, R. Yamamoto, and O. Ueda (Elec. Commun. Lab., Nippon Telegraph & Telephone Public Corp., Musashino-shi, Tokyo); *Elec. Commun. Lab. Tech. J.*, vol. 14, pp. 2375-2432, November 1965.

Repeaters operating at 160 and 320 MHz in the 11 GHz band were built and their operations studied in various ways, for a realization of a PCM repeating system suitable for millimeter wave communication. (In Japanese.)

118

**The Design of Microwave Output Windows**, by T. Ikeuchi (Elec. Commun. Lab., Nippon Telegraph & Telephone Public Corp., Musashino-shi, Tokyo); *Elec. Commun. Lab. Tech. J.*, vol. 15, pp. 399-415, March 1966.

An analysis and a design method are described for resonant-type dielectric windows for microwave tubes, especially for the millimeter-wave band. The relationship between the dimensions of the output window, dielectric constant of the aperture, resonant wavelength and bandwidth are shown. (In Japanese.)

119

**Vacuum-Tight Sapphire Windows for Millimeter Wave Tubes**, by T. Ikeuchi, I. Mitsufuji, H. Ogino, R. Yoshioka, I. Miyata, and M. Kashiwabara (Elec. Commun. Lab., Nippon Telegraph & Telephone Public Corp., Musashino-shi, Tokyo); *Elec. Commun. Lab. Tech. J.*, vol. 15, pp. 417-443, March 1966.

High temperature bakable and vacuum-tight sapphire windows which have low transmission and low return loss characteristics in a broad band of the millimeter wave region are described. (In Japanese.)

120

**Experimental Studies on Atmospheric Ducts and Microwave Fading**, by F. Ikegami, M. Haga, T. Fukuda, and H. Yoshida (Elec. Commun. Lab., Nippon Telegraph & Telephone Public Corp., Musashino-shi, Tokyo); *Elec. Commun. Lab. Tech. J.*, vol. 15, pp. 1195-1229, July 1966.

Perpendicular distributions of refractive index of atmosphere were measured and the duct and K-type fading were investigated. (In Japanese.)

121

**Attenuation of 11 GHz Waves by Wet Snowfall**, by M. Takada and S. Nakamura, (Elec. Commun. Lab., Musashino-shi, Tokyo); *Rev. of ECL*, vol. 14, pp. 27-42, January-February 1966.

Wet snowfall over the propagation path and the attenuation of 11 GHz waves were measured on test circuits, and the attenuation coefficient for wet snowfall was obtained. (In English.)

122

**Diffractor Grating as a New Microwave Repeater**, by M. Takada and M. Shinji (Elec. Commun. Lab., Musashino-shi, Tokyo); *Rev. of ECL*, vol. 14, pp. 53-72, January-February 1966.

Principles and characteristics of the diffractor grating, a new version of microwave passive repeater, are given with test results. The diffractor grating is proved to be applicable to a short-haul microwave system in the high-frequency region such as 11 GHz. (In English.)

123

**S/N Diminishing of Parametric Amplifier due to Noisy Source and Its Counterpoles (In the Case of FM Transmission)**, by T. Okajima, T. Kamata, and H. Komagata (Elec. Commun. Lab., Musashino-shi, Tokyo); *Rev. of ECL*, vol. 14, pp. 400-405, May-June 1966.

General analysis and experimental verification is presented for the decrease in S/N of a parametric amplifier with a noisy pumping source. The PM noise in the pumping source is cancelled out through the two conversion process, therefore, the reflection-type parametric amplifier is suitable for FM transmission. (In English.)