



IEEE TRANSACTIONS ON MICROWAVE THEORY AND TECHNIQUES

FEBRUARY 1974

VOLUME MTT-22

NUMBER 2

A PUBLICATION OF THE IEEE MICROWAVE THEORY AND TECHNIQUES SOCIETY



PAPERS

Transmission of an Optical Wave Beam Through a System of Two Aperture Stops	<i>K. Tanaka and O. Fukumitsu</i>	81
Analysis of Electromagnetic-Wave Modes in Anisotropic Slab Waveguide	<i>Y. Satomura, M. Matsuhara, and N. Kumagai</i>	86
Electromagnetic-Wave Propagation in the Shielded Ring Line	<i>Y. Garault and C. Fray</i>	92
Resonance Conditions of Open Resonators at Microwave Frequencies	<i>T. Itoh and R. Mittra</i>	99
A Vibrating-Dipole Technique for Measuring Millimeter-Wave Fields in Free Space	<i>N. A. Mathews and H. Stachera</i>	103
Semicircular Waveguide-Type Diplexers Used for the Millimeter-Wave Waveguide Transmission System	<i>S. Shimada and N. Suzuki</i>	111
A Design Theory for Wide-Band Parametric Amplifiers	<i>S. Egami</i>	119
Average Output Power of an Incident Wave Randomly Coupled to a Reflected Wave	<i>J. A. Morrison</i>	126

SHORT PAPERS

Ridged Circular Waveguide	<i>Y. Shiao and R. F. H. Yang</i>	130
Magnetostatic Surface Waves in Ferrite Slab Adjacent to Semiconductor	<i>M. Masuda, N. S. Chang, and Y. Matsuo</i>	132
Coupled-Mode Analysis of Longitudinally Magnetized Ferrite Phase Shifters	<i>W. E. Hord and F. J. Rosenbaum</i>	135
Experimental and Computed Four Scattering and Four Noise Parameters of GaAs FET's Up to 4 GHz	<i>A. Anastassiou and M. J. O. Strutt</i>	138
An Automatic System for Simultaneous Measurement of Amplitude and Phase of Millimeter-Wave Fields	<i>N. A. Mathews and H. Stachera</i>	140
High-Frequency Gunn Oscillators	<i>T. G. Ruttan</i>	142
Application of Quarter-Wave Transformers for Precise Measurement of Complex Microwave Conductivity of Semiconductors	<i>P. K. Roy and A. N. Datta</i>	144
Factors Limiting the Signal-to-Noise Ratio of Negative-Conductance Amplifiers and Oscillators in FM/FDM Communications Systems	<i>A. A. Sweet</i>	146

LETTERS

Comments on "Wave Propagation on Nonuniform Transmission Lines"	<i>S. C. Dutta Roy</i>	149
---	------------------------	-----

CONTRIBUTORS	151
------------------------	-----



IEEE MICROWAVE THEORY AND TECHNIQUES SOCIETY

The Microwave Theory and Techniques Society is an organization, within the framework of the IEEE, of members with principal professional interest in the field of microwave theory and techniques. All members of the IEEE are eligible for membership in the Society and will receive this TRANSACTIONS upon payment of the annual Society membership fee of \$7.00. Affiliate membership is available upon payment of the annual affiliate fee of \$18.00. For information on joining write to the IEEE at the address below.

ADMINISTRATIVE COMMITTEE

R. A. RIVERS, *President*

H. W. COOPER, *Vice President*

H. STINEHELPER, *Secretary-Treasurer*

J. L. ALLEN
R. W. BEATTY
A. CLAVIN*
A. W. GUY

G. I. HADDAD
J. B. HORTON
R. M. KNOX
N. LIPETZ

S. OKWIT*
H. G. OLTMAN
D. PARKER
G. P. RODRIGUE

F. J. ROSENBAUM
H. SOBOL
R. A. SPARKS
J. J. TAUB

D. F. WAIT
L. R. WHICKER

* *Ex officio (past chairmen)*

Honorary Life Members

A. C. BECK

W. W. MUMFORD

National Lecturer

JOHN L. ALLEN

S-MTT Chapter Chairmen

Atlanta H. A. ECKER
Baltimore L. K. STALEY
Boston R. LEVY
Boulder-Denver R. L. GALLAWAY
Chicago R. N. HARGIS
Columbus G. A. THIELE
Connecticut M. GILDEN
Dallas M. L. WALLACE
Fort Worth S. D. COLEMAN
Houston H. C. BOURNE, JR.
Huntsville O. C. WILLIAMS

NY/Long Island M. A. BALFOUR
Los Angeles Council D. E. KREINHEDER
Milwaukee R. H. FARMER
Montreal T. M. CHAN
N. J. Coast W. B. GLENDINNING
North Jersey S. ANGHEL
Orange County J. A. SANGUINET
Orlando E. E. ERICKSON
Ottawa W. J. STEENAART
Philadelphia J. E. MULHOLLAND
Phoenix T. A. DE MASSA

St. Louis J. A. ZIEGLER
San Diego D. RUBIN
San Francisco D. E. MESSNER
Schenectady I. W. PENCE, JR.
Seattle A. RUDZITIS
S. E. Michigan W. G. JAECKLE
Syracuse A. T. ADAMS
Tel Aviv A. I. MADJAR
Tokyo, Japan S. SAITO
Tucson E. P. PIERCE
Washington, D. C. B. E. SPIELMANN

IEEE TRANSACTIONS® ON MICROWAVE THEORY AND TECHNIQUES

Editor

F. J. ROSENBAUM

H. G. OLTMAN
(*Institutional Listings*)

J. W. BANDLER
(*Computer Program
Descriptions*)

Associate Editors

M. CAULTON
(*Special Issues*)

T. OKOSHI
(*Abstracts Editor— Asia*)

Address all manuscripts to the Editor, F. J. Rosenbaum, Dep. Elec. Eng., Washington Univ., St. Louis, Mo. 63130. Submission of three copies of manuscripts, including figures, will expedite the review.

THE INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS, INC.

Officers

JOHN J. GUARRERA, *President*
JOHN D. RYDER, *Vice President*
ARTHUR P. STERN, *Vice President, Regional Activities*
ROBERT F. COTELLESA, *Vice President, Technical Activities*

FRANK S. BARNES, *Vice President, Publication Activities*
SEYMOUR CAMBIAS, JR., *Secretary*
JOSEPH K. DILLARD, *Treasurer*

Headquarters Staff

DONALD G. FINK, *Executive Director*

ELWOOD K. GANNETT, *Director, Publishing Services*
WILLIAM J. KEYES, *Director, Administrative Services*
JOHN M. KINN, *Director, Educational Service*
CHARLES F. STEWART, JR., *Director, Member and Field Services*

BETTY J. STILLMAN, *Executive Assistant to the Executive Director*
RICHARD M. EMERSON, *Director, Technical Services*
EDWIN D. MACDONALD, *Conference Services*
SAVA I. SHERR, *Standards*

Editorial Department

H. JAMES CARTER, *Manager, Editorial Services*

Senior Editors: NANCY B. BUDDE,* ANN H. BURGMAYER, CAROLYN ELENOWITZ, GAIL S. FERENC, NELA RYBOWICZ
Associate Editors: CLARA FEGER, HELEN S. GOLDMAN, TRUMBULL ROGERS

* *Responsible for this Transactions*

IEEE TRANSACTIONS ON MICROWAVE THEORY AND TECHNIQUES is published monthly by The Institute of Electrical and Electronics Engineers, Inc., 345 East 47 Street, New York, N. Y. 10017. Responsibility for the contents rests upon the authors and not upon the IEEE, the Society, or its members. This journal is available in either microfiche or printed form. Individual copies may be purchased at \$3.00 (first copy only) by IEEE members and \$6.00 per copy by nonmembers. Annual subscription price: IEEE members dues plus Society fee. Price for nonmembers available on request. Abstracting is permitted with mention of source. All rights, including translation, are reserved by the IEEE. Requests for republication permission should be addressed to the IEEE Editorial Department, 345 East 47 Street, New York, N. Y. 10017. Copyright © 1974 by The Institute of Electrical and Electronics Engineers, Inc. Printed in U.S.A. Second-class postage paid at New York, N. Y., and at additional mailing offices.