



IEEE TRANSACTIONS ON MICROWAVE THEORY AND TECHNIQUES

APRIL 1974

VOLUME MTT-22

NUMBER 4

A PUBLICATION OF THE IEEE MICROWAVE THEORY AND TECHNIQUES SOCIETY



PAPERS

- A Restatement of Mathematical Considerations of TEM Modes on an n -Wire Line. *N. Nagai and A. Matsumoto* 353
- Optimum Filling of Ferrite Phase Shifters of Uniform Dielectric Constant. *H. C. Bell, Jr., and C. R. Boyd, Jr.* 360
- Microwave Measurement of a Complex Dielectric Constant Over a Wide Range of Values by Means of a Waveguide-Resonator Method. *C. Das Gupta* 365
- A Spectral Domain Analysis for Solving Microstrip Discontinuity Problems. *Y. Rahmat-Samii, T. Itoh, and R. Mittra* 372
- Theory of Coupled Open Transmission Lines and Its Applications. *M. Matsuhara and N. Kumagai* 378
- An S-Band Radiometer Design with High Absolute Precision. *W. N. Hardy, K. W. Gray, and A. W. Love* 382
- Influence of Surface Metallization on the Propagation Characteristics of Surface Magnetostatic Waves in an Axially Magnetized Rectangular YIG Rod. *K. Kawasaki and M. Umeno* 391
- Waveguide Sandwich Filters. *J. D. Rhodes* 394
- Composite-Junction Circulators Using Ferrite Disks and Dielectric Rings. *J. Helszajn* 400
- Electronic Phase Shifter for Millimeter-Wave Semiconductor Dielectric Integrated Circuits. *H. Jacobs and M. M. Chrepta* 411
- Electrode Resistance Effects in Interdigital Transducers. *K. M. Lakin* 418
- Nonminimum-Phase Optimum-Amplitude Bandpass Waveguide Filters. *A. E. Atia and A. E. Williams* 425
- Continuous Exposure of Chicks and Rats to Electromagnetic Fields. *A. J. Giarola and W. F. Krueger* 432
- A Microwave Decoupled Brain-Temperature Transducer. *L. E. Larsen, R. A. Moore, and J. Acevedo* 438

SHORT PAPERS

- Microwave Oscillator Noise Measuring System Employing a YIG Discriminator. *K. Watanabe and I. Takao* 444
- A Numerical Method Based on the Discretization of Maxwell Equations in Integral Form. *M. Albani and P. Bernardi* 446
- Low-Noise Mixer in Oversized Microstrip for 5-mm Band. *P. J. Meier* 450
- Simplified 12-GHz Low-Noise Converter with Mounted Planar Circuit in Waveguide. *Y. Konishi, K. Uenakada, N. Yazawa, N. Hoshino, and T. Takahashi* 451
- Efficient Numerical Computation of the Frequency Response of Cables Illuminated by Electromagnetic Field. *C. R. Paul* 454
- On the Calibration Process of Automatic Network Analyzer Systems. *S. Rehnmark* 457
- Design of Optimum Acoustic Surface Wave Delay Lines at Microwave Frequencies. *A. J. Slobodnik, Jr., and T. L. Szabo* 458
- Application of Microstrip Analysis to the Design of a Broad-Band Electrooptical Modulator. *E. Yamashita, K. Atsuki, and T. Akamatsu* 462
- A MIC Phase-Locked Loop Avalanche Oscillator in X Band. *J. Salmon* 464
- The Determination of an Excess Capacitance. *H. J. Riblet* 467

LETTERS

- The Exact Numerical Evaluation of the Complex Dielectric Constant of a Dielectric Partially Filling a Waveguide. *P. I. Somlo* 468
- The Impedance and Scattering Properties of a Perfectly Conducting Strip Above a Plane Surface-Wave System. *J. Brown* 469
- Comments on "Measured Noise Temperature Versus Theoretical Electron Temperature for Gas Discharge Noise Sources". *R. E. Guentzler* 469
- Microwave Dielectric Properties of an Amorphous Semiconductor System. *L. K. Wilson, G. T. O'Reilly, and D. L. Kinser* 470
- Anomalies in Duplexing Very Short Pulses. *D. J. Fitzgerald and J. M. Proud* 471
- Addenda to "The Exact Dimensions of a Family of Rectangular Coaxial Lines with Given Impedance". *H. J. Riblet* 473
- Correction to "Fast Parameters Calculation of the Dielectric-Supported Air-Strip Transmission Line. *E. Costamagna* 474

CONTRIBUTORS. 475



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. STINEHELFER, *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
Baltimore
Boston
Boulder-Denver
Chicago
Columbus
Connecticut
Dallas
Fort Worth
Houston
Huntsville

H. A. ECKER
L. K. STALEY
R. LEVY
R. L. GALLAWAY
R. N. HARGIS
G. A. THIELE
M. GILDEN
M. L. WALLACE
S. D. COLEMAN
H. C. BOURNE, JR.
O. C. WILLIAMS

NY/Long Island
Los Angeles Council
Milwaukee
Montreal
N. J. Coast
North Jersey
Orange County
Orlando
Ottawa
Philadelphia
Phoenix

M. A. BALFOUR
D. E. KREINHEDER
R. H. FARMER
T. M. CHAN
W. B. GLENDINNING
S. ANGHEL
J. A. SANGUINET
E. E. ERICKSON
W. J. STEENAART
J. E. MULHOLLAND
T. A. DE MASSA

St. Louis
San Diego
San Francisco
Schenectady
Seattle
S. E. Michigan
Syracuse
Tel Aviv
Tokyo, Japan
Tucson
Washington, D. C.

J. A. ZIEGLER
D. RUBIN
D. E. MESSNER
I. W. PENCE, JR.
A. RUDZITIS
N. A. MASNARI
A. T. ADAMS
A. I. MADJAR
S. SAITO
E. P. PIERCE
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, CAROLYNE 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.