



IEEE TRANSACTIONS ON

MICROWAVE THEORY AND TECHNIQUES

NOVEMBER 1984

VOLUME MTT-32

NUMBER 11

(ISSN 0018-9480)

A PUBLICATION OF THE IEEE MICROWAVE THEORY AND TECHNIQUES SOCIETY



PAPERS

- A Generalized Formulation of Electromagnetically Coupled Striplines *B. N. Das and K. V.S.V.R. Prasad* 1427
- Amplification by Interdigital Excitation of Space-Charge Waves in Semiconductors *H. Baudrand, T. El Khoury, and D. Lilonga* 1434
- The Electrostatic Field of Conducting Bodies in Multiple Dielectric Media *S. M. Rao, T. K. Sarkar, and R. F. Harrington* 1441
- A True Elliptic-Function Filter Using Triple-Mode Degenerate Cavities *W.-C. Tang and S. K. Chaudhuri* 1449
- Accurate Hybrid-Mode Analysis of Various Finline Configurations Including Multilayered Dielectrics, Finite Metallization Thickness, and Substrate Holding Grooves *R. Vahldieck* 1454
- Regenerative Frequency Division with a GaAs FET *C. Rauscher* 1461
- Coupled-Mode Theory of Two Nonparallel Dielectric Waveguides *M. A. McHenry and D. C. Chang* 1469

SHORT PAPERS

- Even- and Odd-Mode Impedances of Coupled Elliptic Arc Strips *B. N. Das and K. V.S.V.R. Prasad* 1475
- Computer-Optimized Multisection Transformers between Rectangular Waveguides of Adjacent Frequency Bands *F. Arndt, U. Tucholke, and T. Wriedt* 1479
- Analysis of a Finline with Finite Metallization Thickness *T. Kitazawa and R. Mittra* 1484
- An Evanescent Mode Waveguide Bandpass Filter at *Q*-Band *N. P. Akers and P. D. Allan* 1487
- Extension of Levy's Large-Aperture Design Formulas to the Design of Circular Irises in Coupled-Resonator Waveguide Filters *A. Jennings and R. L. Gray* 1489
- A Technique to Identify Electromagnetic Modes in Oversize Waveguides *Y. Carmel, K. R. Chu, M. E. Read, V. L. Granatstein, G. Faillon, P. Boulanger, E. Kammerer, and G. Mourier* 1493
- Waveguide Modes Via an Integral Equation Leading to a Linear Matrix Eigenvalue Problem *G. Conciauro, M. Bressan, and C. Zuffada* 1495
- Correction to "Quasi-Optical Method for Measuring the Complex Permittivity of Materials" *F. I. Shimabukuro* 1504

-
- PATENT ABSTRACTS *N. R. Dietrich* 1505

ASIAN ABSTRACTS

- Papers from Journals Published in Australia, India, and Japan *E. Yamashita* 1510
-



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 \$8.00. Affiliate membership is available upon payment of the annual affiliate fee of \$24 00, plus the Society fee of \$8.00. For information on joining write to the IEEE at the address below.

ADMINISTRATIVE COMMITTEE

H. G. OLTMAN, JR., *President*

H. HOWE, JR., *Vice President*

J. E. RAUE, *Secretary-Treasurer*

N. W. COX
J. E. DEGENFORD, JR.
V. G. GELNOVATCH
P. T. GREILING
R. B. HICKS

T. ITOH
F. IVANEK
G. JERINIC
R. S. KAGIWADA
R. H. KNERR

H. J. KUNO
S. L. MARCH
D. N. MCQUIDDY, JR.
E. C. NIEHENKE
J. M. ROE

F. J. ROSENBAUM*
C. T. RUCKER*
R. A. SPARKS*
B. E. SPIELMAN

* *Ex officio (past presidents)*

Honorary Life Members

A. C. BECK
S. B. COHN

W. W. MUMFORD

A. A. OLINER
T. S. SAAD

K. TOMIYASU
L. YOUNG

S. ADAM
P. T. GREILING
S. WEINREB

Distinguished Lecturers

S-MTT Chapter Chairmen

Albuquerque: J. P. CASTILLO
Atlanta: G. K. HUDDLESTON
Baltimore: PETER D. HRYCAK
Benelux: A. GUISSARD
Buffalo: INACTIVE
Canaveral: C. F. A. CHUANG
Central Illinois: G. E. STILLMAN
Central New England: C. D. BERGLUND
Chicago: S. S. SAAD
Columbus: N. WANG
Connecticut: M. GILDEN
Dallas: R. E. LEHMANN
Denver-Boulder: G. R. OLHOEFT
Florida West Coast: R. E. HENNING
Houston: S. LONG
Huntsville: M. D. FAHEY

India: B. BHAT
Israel: A. MADJAR
Kitchener-Waterloo: Y. L. CHOW
Los Angeles: F. J. BERNUES
Milwaukee: T. J. KUCHARSKI
Montreal: J. L. LEIZEROWICZ
New Jersey Coast: RUSSELL A. GILSON
New York/Long Island: R. KAMINSKY
North Jersey: M. SCHNEIDER
Orange County: J. C. AUKLAND
Orlando: F. P. WILCOX
Ottawa: J. WIGHT
Philadelphia: D. L. JAGGARD
Phoenix: LEX AKERS
Portland: R. C. CHEW
Princeton: WALTER SLUSARK

San Diego: D. T. GAVIN
Santa Clara Valley: R. W. WONG
Schenectady: J. BORREGO
Seattle: D. G. DOW
Southeastern Michigan: D. P. NYQUIST
St. Louis: CURTIS E. LARSON
Sweden: E. L. KOLLBERG
Switzerland: F. E. GARDIOL
Syracuse: B. K. MITCHELL
Tokyo: T. OKOSHI
Tucson: E. P. PIERCE
Twin Cities: C. R. SEASHORE
Utah/Salt Lake City: M. F. ISKANDER
Washington/Virginia: Z. TURSKI
West Germany: N. J. KEEN

IEEE TRANSACTIONS® ON MICROWAVE THEORY AND TECHNIQUES

Editor

T. ITOH

Associate Editors

N. R. DIETRICH
(*Patent Abstracts*)

F. IVANEK

E. YAMASHITA
(*Abstracts Editor—Asia*)

THE INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS, INC.

Officers

RICHARD J. GOWEN, *President*
CHARLES A. ELTON, *President-Elect*
HENRY L. BACHMAN, *Executive Vice President*
CYRIL J. TUNIS, *Treasurer*
V. PRASAD KODALI, *Secretary*

J. BARRY OAKES, *Vice President, Educational Activities*
RUSSEL C. DREW, *Vice President, Professional Activities*
JOSE B. CRUZ, JR., *Vice President, Publication Activities*
MERRILL W. BUCKLEY, JR., *Vice President, Regional Activities*
STEPHAN KAHNE, *Vice President, Technical Activities*

E. W. PUGH, *Division IV Director*

Headquarters Staff

ERIC HERZ, *Executive Director and General Manager*
ELWOOD K. GANNETT, *Deputy General Manager*

THOMAS W. BARTLETT, *Controller*
DONALD CHRISTIANSEN, *Editor of Spectrum*
IRVING ENGELSON, *Staff Director, Technical Activities*
LEO FANNING, *Staff Director, Professional Activities*
SAVA SHERR, *Staff Director, Standards*

DAVID L. STAIGER, *Staff Director, Publishing Services*
CHARLES F. STEWART, JR., *Staff Director, Administration Services*
DONALD L. SUPPERS, *Staff Director, Field Services*
THOMAS C. WHITE, *Staff Director, Public Information*
JOHN F. WILHELM, *Staff Director, Professional Activities*

Publications Department

Production Managers: ANN H. BURGMAYER, CAROLYN TAMNEY, GAIL S. FERENC,
Associate Editor: WILLIAM J. HAGEN

IEEE TRANSACTIONS ON MICROWAVE THEORY AND TECHNIQUES is published monthly by The Institute of Electrical and Electronics Engineers, Inc. **Headquarters:** 345 East 47 Street, New York, NY 10017. Responsibility for the contents rests upon the authors and not upon the IEEE, the Society, or its members. **IEEE Service Center** (for orders, subscriptions, address changes, Region/Section/Student Services): 445 Hoes Lane, Piscataway, NJ 08854. **Telephones:** Headquarters 212-705 + extension: Information -7900, General Manager -7910, Controller -7748, Educational Services -7860, Publishing Services -7560, Standards -7960, Technical Services -7890. IEEE Service Center 201-981-0060. Professional Services: Washington Office 202-785-0017. **NY Telecopier:** 212-752-4929. **Telex:** 236-411 (International messages only). Individual copies: IEEE members \$6.00 (first copy only), nonmembers \$12.00 per copy. Annual subscription price: IEEE members, dues plus Society fee. Price for nonmembers on request. Available in microfiche and microfilm. **Copyright and Reprint Permission:** Abstracting is permitted with credit to the source. Libraries are permitted to photocopy beyond the limits of U.S. Copyright law for private use of patrons: (1) those post-1977 articles that carry a code at the bottom of the first page, provided the per-copy fee indicated in the code is paid through the Copyright Clearance Center, 29 Congress Street, Salem, MA 01970; (2) pre-1978 articles without fee. Instructors are permitted to photocopy isolated articles for noncommercial classroom use without fee. For other copying, reprint or republication permission, write to Director, Publishing Services at IEEE Headquarters. All rights reserved. Copyright © 1984 by The Institute of Electrical and Electronics Engineers, Inc. Printed in U.S.A. Second-class postage paid at New York, NY and at additional mailing offices. **Postmaster:** Send Address changes to IEEE, 445 Hoes Lane, Piscataway, NJ 08854.