



IEEE TRANSACTIONS ON MICROWAVE THEORY AND TECHNIQUES

MAY 1978

VOLUME MTT-26

NUMBER 5

A PUBLICATION OF THE IEEE MICROWAVE THEORY AND TECHNIQUES SOCIETY



SPECIAL ISSUE ON HIGH-POWER MICROWAVES

FOREWORD

Special Issue on High-Power Microwaves	<i>K. Tomiyasu</i>	321
--	--------------------	-----

PAPERS

A Wideband Linear FM Ramp Generator for the Long-Range Imaging Radar	<i>D. R. Bromaghim and J. P. Perry</i>	322
High Power X-Band Monopulse Tracking Feed for the Lincoln Laboratory Long-Range Imaging Radar	<i>K. R. Goudey and A. F. Sciambi, Jr.</i>	326
A Mode Transducing Antenna	<i>R. D. Wengenroth</i>	332
The Beamed Power Microwave Transmitting Antenna	<i>R. M. Dickinson</i>	335
A Reactive Fourth-Harmonic Filter Operating at 400-kW CW	<i>H. J. Mohr</i>	341
X-Band High-Power Multipactor Receiver Protector	<i>T. P. Carlisle</i>	345
A High-Power Switching Network for a Dual Mode Antenna	<i>V. J. Albanese and D. Kerbs</i>	348
Characteristics of High-Power Breakdown at 28 GHz	<i>M. Nakamura, T. Saito, and M. Kuramoto</i>	354
Thermal Stress-Induced Breakdown in an S-Band Isolator	<i>D. C. Buck and M. L. King</i>	357
A 50-kW CW Ferrite Circulator in S Band	<i>C. Fournet-Fayas, A. C. Priou, and G. E. Forterre</i>	360
Design of a High-Power CW Y-Junction Waveguide Circulator	<i>F. Okada and K. Okwi</i>	364
Generation of Microwave Power with a Spark-Gap Cavity	<i>V. M. Ristic and T. P. Sorensen</i>	369
Correction to "Behavior of the Magnetostatic Wave in a Periodically Corrugated YIG Slab"	<i>M. Tsutsumi, Y. Sakaguchi, and N. Kumagai</i>	374

COMPUTER PROGRAM DESCRIPTIONS

Mie Series Solution for a Sphere	<i>J. R. Mautz</i>	375
--	--------------------	-----

CONTRIBUTORS		376
--------------------	--	-----

TECHNICAL NOTES

An Analysis of Microwave De-Embedding Errors	<i>L. A. Glasser</i>	379
--	----------------------	-----



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 \$20.00. For information on joining write to the IEEE at the address below.

ADMINISTRATIVE COMMITTEE

H SOBOL, *President*

S F ADAM

J L ALLEN

J C AUKLAND

K J BUTTON

H W COOPER*

* *Ex officio (past presidents)*

D. PARKER, *Vice President*

J E DEGENFORD, JR.

J B HORTON

F H HOWE

R H KNERR

E L KOMAREK

R. B. HICKS, *Secretary-Treasurer*

H J KUNO

H G OLTMAN, JR.

G P RODRIGUE*

C T RUCKER

L R WHICKER*

F J ROSENBAUM

H E SCHRANK

R A SPARKS

B E SPIELMAN

L R WHICKER*

A. CLAVIN
H. W. COOPER

R. W. DAMON
R. A. RIVERS

Honorary Life Members

G. P. RODRIGUE
T. S. SAAD

K. TOMIYASU
L. R. WHICKER

National lecturer

J. M. OSEPCHEW
C. A. LIECHTI

S-MTT Chapter Chairmen

Albuquerque J. YU
Atlanta C E RYAN, JR
Baltimore B D GILLER
Benelux (interim) E J. MAANDARES
Boston R W LATON
Central Illinois G E STILLMAN
Chicago G A BOWMAN
Columbus WALTER D BURNSIDE
Dallas T B CANNON
Denver C T JOHNK
Florida West Coast W E CLAUSEN
Houston S A LONG
Huntsville M D FAHEY

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

D P. SETHI
Y HIPSH
J A MEZAK
H POMERANZ
R C GARNIER
GAR LAM YIP
H WICHANSKY
E W NIEMIEC
J C AUKLAND
D N BOWYER
R P DOUVILLE
D D KHANDELWAL

Phoenix
Portland
Princeton
St Louis
San Diego
Santa Clara V /O-EB/SF
Schenectady
Seattle
S E Michigan
Syracuse
Tokyo, Japan
Washington, DC

R S STRAWN
P P FASANG
R L CAMISA
L M DGYESI-MITSCHANC
P M HANSEN
L BESSER
J R ESHBACH
M D WEBB
D L SENGUPTA
D L BINSLEY
T MAKIMOTO
G KANTOR

IEEE TRANSACTIONS® ON MICROWAVE THEORY AND TECHNIQUES

Editor

J L ALLEN H G OLTMAN, JR. J E DEGENFORD, JR
(*Applications*) (*Business Editor*)

Associate Editors

B PERLMAN M CAULTON T OKOSHI
(*Computer Program Descriptions*) (*Special Issues*) (*Abstracts Editor—Asia*)

H E SCHRANK
(*Institutional Listing*)

Address all manuscripts to the Editor, J. L. Allen, Electrical and Electronic Systems, University of South Florida, Tampa, FL 33620. Submission of three copies of manuscripts, including figures, will expedite the review. *Publication Policy*: All papers will be reviewed for their technical merit, and decisions to publish will be made independently of an author's ability or willingness to pay charges. Voluntary page charges of \$70 per printed page will be requested for papers of five pages or less. Page charges of \$100 per page are mandatory for each page in excess of five printed pages. Also, the MTT-S Administrative Committee has established a quota for the number of pages printed in each issue of this TRANSACTIONS whose costs are not defrayed by payment of page charges. Papers not covered by page charges may be delayed until space in an issue is available. The Editor can waive the quota requirement for exceptional papers or because of other extenuating circumstances.

THE INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS, INC.

Officers

IVAN A. GETTING, *President*
C LESTER HOGAN, *Executive Vice President*
ROBERT D. BRISKMAN, *Secretary-Treasurer*
PAUL F CARROLL, *Vice President, Regional Activities*

ERIC HERZ, *Vice President, Technical Activities*
ROBERT W. LUCKY, *Vice President, Publication Activities*
JEROME J. SURAN, *Vice President, Educational Activities*
BRUNO O. WEINSCHEL, *Vice President, Professional Activities*

RICHARD W. DAMON, *Division IV Director*

Headquarters Staff

RICHARD M. EMBERSON, *Executive Director and General Manager*

THOMAS W. BARTLETT, *Controller*
DONALD CHRISTIANSEN, *Editor of Spectrum*
(RICHARD M. EMBERSON), *Staff Director, Educational, Field Standards, and Technical Services*

ELWOOD K. GANNETT, *Staff Director, Publishing Services*
JOHN M. KINN, JR., *Staff Director, Professional Services*
NEIL D. PUNDIT, *Director Technical Activities*
CHARLES F STEWART, JR., *Staff Director, Administration Services*

Publications Department

Director, Publication Production: H. JAMES CARTER

Production Managers: STEPHANIE BLUDAU, ANN H. BURGMEYER, CAROLYN ELENOWITZ, GAIL S. FERENC*

Associate Editors: PRIJONO HARDJOWIROGO, JOSEPH MORSICATO, PATRICIA H. NOLAN, KALLIE ZAPITI

* *Responsible for this Transactions*

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) 445 Hoes Lane, Piscataway, NJ 08854. **Telephones:** Headquarters 212-644-7 extension. Information -7900, General Manager -7910, Controller -7748, Educational Services -7860, Publishing Services -7560, Region/Section Services -7750, Standards -7960, Technical Services -7890. IEEE Service Center 201-981-0060. Washington Office/Professional Services 202-785-0017. Individual copies: IEEE members \$5.00 (first copy only), nonmembers \$10.00 per copy. Annual subscription price: IEEE members, dues plus Society fee. Price for nonmembers on request. Available in microfiche and microfilm. **Copyright and Reprint Permissions:** 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, P.O. Box 765, Schenectady, NY 12301; (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 © 1978 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.