

Workshops

WSA: Microwave Photonic Systems

Date: Monday, June 10, 1991
Time: 8:00 a.m.–12:30 p.m.
Location: Room 311—Hynes Convention Center
Sponsor: MTT-3 Lightwave Technology
Organizer: A.J. Seeds, University College London
Speakers: C.H. Cox III, MIT Lincoln Laboratory
P.R. Herczfeld, Drexel University
A.A.A. de Salles, Catholic University of Rio de Janeiro
D.R. Wright, RSRE, Malvern

Abstract:

Opto-electronic techniques are finding increasing application within microwave systems. Examples of applications include microwave antenna remoting, optical signal processing, optical control of phased array antennas and optical distribution of video signals using microwave sub-carriers. This workshop is intended to describe the devices and techniques used, to provide the basis for the analysis of microwave photonic systems and to review current applications. The level of treatment will not assume detailed familiarity with opto-electronic technology. Topics to be covered will include microwave modulation of semiconductor lasers, external modulators and heterodyne systems; fast detectors; photonic link performance analysis including bandwidth, noise and non-linear effects; optically controlled microwave devices; optical control of phased arrays; multiplexed video distribution systems; optical signal processing and antenna remoting.

The format for the workshop will be tutorial-style presentations by the invited speakers with ample time allowed for questions and discussions.

WSB: Optical Probing of Microwave Circuits and Materials

Date: Monday, June 10, 1991
Time: 1:30–5:00 p.m.
Location: Room 311—Hynes Convention Center
Sponsors: MTT-3 Lightwave Technology
MTT-16 Microwave Systems
Organizer: Chi H. Lee, University of Maryland
Speakers: G. Arjavalingam, IBM
H.R. Fetterman, UCLA
Chi H. Lee, University of Maryland

Abstract:

This workshop is intended to stimulate activity and as a forum for the exchange of new ideas among those who are interested in using optical technology to solve microwave/millimeter wave problems. It will feature tutorial review and advanced talks by the leading experts in the area of optical microwave interactions. H. Fetterman will talk about “Optical Measurements and Control of Three Terminal Devices”, Chi H. Lee will discuss “Ultrafast Optics and Microwave Technology”. This will include optical on-wafer measurements, characterization, phase locking, two dimensional field mapping and sampling of the microwave devices and circuits. “Broadband Microwave Measurements with Picosecond Radiation” will be given by G. Arjavalingam. This technique has been used to characterize the complex dielectric constants of materials from 10 to 125 GHz in a single measurement.

Workshops

WSC: Microwave Superconductivity Short Course

Date: Monday, June 10, 1991
Time: 8:00 a.m.–12:00 p.m.
Location: Room 309—Hynes Convention Center
Sponsor: MTT-18 Microwave Superconductivity Applications
Organizer: Professor S. Sridhar, Dept. of Physics, Northeastern University
Speakers: To Be Announced

Abstract:

This half-day short course on Microwave Superconductivity is designed for microwave engineers who may need to be involved in development and research in microwave aspects of superconductivity. Participants are expected to be both those with little or no previous exposure to the basics of superconductivity, and also those who may have some experience in other (non-microwave) aspects of superconductivity. The lectures will be delivered by experts in the field.

The topics that will be covered are:

- Introduction to basic aspects of superconductivity
- Microwave properties of superconductors
- Characterization of microwave properties
- High power properties

WSD: UHF and Active Filter Technology

Date: Monday, June 10, 1991
Time: 8:00 a.m.–5:00 p.m.
Location: Room 313—Hynes Convention Center
Sponsors: MTT-2 Microwave Acoustics
MTT-8 Microwave Network Theory
Organizers: R.R. Bonetti, COMSAT Laboratories
B. McAvoy, Westinghouse
Speakers: Active Filters (AM)
T. Itoh, University of Texas, Austin
M.J. Shindler, Raytheon Company
S.E. Sussman-Fort, State University of New York
A.E. Williams, COMSAT Laboratories
UHF Filters (PM)
A. Ballato, U.S. Army LABCOM
S.V. Krisnaswamy, Westinghouse STC
D. Malocha, University of Central Florida
B. Miller, Westinghouse ESG

Abstract:

This full day workshop will devote a half day to active filter technology and half a day to UHF filter technology. Speakers will provide a comprehensive overview of current advances in the areas of MIC and MMIC active filter design, SAW filter design, Acoustic Charge Transport, Integrated Film resonator filters, dielectric and quartz filter networks. The presentations will cover both the tutorial and the state of the art aspects, including comparisons and trade-offs between different techniques.

Workshops

WSE: New Packaging Techniques for MMICs and Discrete Devices

Date: Monday, June 10, 1991
Time: 8:00 a.m.–5:00 p.m.
Location: Room 312 (morning), Room 309 (afternoon)—Hynes Convention Center
Sponsor: MTT-12 Microwave and Millimeter Wave Packaging
Organizers: Bert Berson, Berson & Associates
Doug Maki, M/A-COM
Fred Rosenbaum, Washington University
Richard Sparks, Raytheon Company

Speakers/Topics:

- A. Morning Session 8:00 a.m.–12:00 p.m. (joint with WSF)
1. “Physical Description of Parasitic Mode Effects and Their Influence on Crosstalk and Package Effects”, Arthur A. Oliner, Polytechnic University
 2. “Metals, Ceramics, and Metal Matrix Composites: Materials for MIC/MMIC Packages”, Mike Borkowski, Raytheon Co.
 3. “Coupling Effects Due to Resonances in Large Millimeter-Wave Packages”, Robert W. Jackson, University of Massachusetts.
 4. “Precision Microwave Measurement Techniques to Support Package Modeling”, by Werner Schuerch and John Tatum, Intercontinental Microwave Corp.
 5. “Crosstalk in Planar Circuits Due to Resonances in Large Millimeter-Wave Packages”, Ingo Wolff, University of Duisburg.
- B. Afternoon Session 1:00 p.m. to 5:00 p.m.
6. “Improved Techniques for Package Characterization”, Jeff Williams, Cascade Microtech.
 7. “Batch Processing/Batch Fabrication of MMIC Modules”, Rick Perko, M/A-COM, Inc. and Bernie Geller, COMSAT.
 8. “Microwave Common Modules—Current Status”, Ian Williamson, M/A-COM, Ltd.

Abstract:

The purpose of this workshop is to bring to the attention of the microwave community new materials and techniques for microwave and millimeter wave device component and system packaging. Topics to be presented include metal, ceramic, plastic and metal matrix packages, batch processing of modules, measurement techniques to precisely characterize package performance and the status of microwave common modules. Discussions on the role of standards in packaging and key issues of cost and manufacturability will be addressed and opportunity for inputs from workshop participants is encouraged.

Workshops

WSF: Loss, Crosstalk and Package Effects in Microwave and Millimeter-Wave Integrated Circuits

Date: Monday, June 10, 1991
Time: 8:00 a.m.–5:00 p.m.
Location: Room 312—Hynes Convention Center
Sponsor: MTT-15 Microwave Field Theory
Organizers: Arthur A. Oliner, Polytechnic University
Ingo Wolff, University of Duisburg
Moderators: Ingo Wolff, Tatsuo Itoh
Speakers: Wolfgang Heinrich, Technical University of Darmstadt
Tatsuo Itoh, University of California, Los Angeles
Robert W. Jackson, University of Massachusetts
Arthur A. Oliner, Polytechnic University
Ingo Wolff, Duisburg University

Abstract:

During the last several years, much effort has been spent on the development of numerical models for the design of microwave and millimeter-wave integrated circuits. Several recent workshops have been devoted to those developments. The purpose of the present workshop is to stimulate activities and exchange ideas in the area of parasitic effects, which have been neglected to a large extent to date. Although these effects are usually viewed as being of “second order”, they may have serious first-order impact on circuit performance under appropriate circumstances. In this workshop, a careful look shall be taken at phenomena such as loss, crosstalk and package effects, which have significant influence on the final design of the overall performance of MICs and MMICs. The emphasis will be upon three main issues:

1. The physical nature and the excitation conditions for various parasitic modes, including surface wave modes, resonant package modes, modes in lossy structures, and unexpected leakage from printed-circuit dominant modes.
2. The impact of these modes on circuit design. Discussions will include package resonances excited by discontinuities, mode conversion at line discontinuities, the influence of the field inside lossy transmission lines on dispersion properties, and crosstalk within the circuit, excited by surface-wave modes and by leakage effects.
3. Models to characterize the various parasitic effects, which are carefully compared with measurements.

The workshop will consist of two half-day sessions. The morning session will be held jointly with Workshop WSE, and consists of keynote talks by experts who will present background material and current perspectives on these topics.

- A. Morning Session 8:00 a.m.–12:00 p.m. (joint with WSE)
1. “Physical Description of Parasitic Mode Effects and Their Influence on Crosstalk and Package Effects”, Arthur A. Oliner, Polytechnic University
 2. “Metals, Ceramics, and Metal Matrix Composites: Materials for MIC/MMIC Packages”, Mike Borkowski, Raytheon Co.
 3. “Coupling Effects Due to Resonances in Large Millimeter-Wave Packages”, Robert W. Jackson, University of Massachusetts.
 4. “Precision Microwave Measurement Techniques to Support Package Modeling”, by Werner Schuerch and John Tatum, Intercontinental Microwave Corp.
 5. “Crosstalk in Planar Circuits Due to Resonances in Large Millimeter-Wave Packages”, Ingo Wolff, University of Duisburg.
- B. Afternoon Session 1:00 p.m. to 5:00 p.m.
1. “Conductor Losses and Their Influence on Circuit Performance in Planar MICs”, Wolfgang Heinrich, Technical University of Darmstadt.
 2. “Simple Loss Calculation in Planar Circuits”, Tatsuo Itoh, UCLA.

The rest of the afternoon session shall be used for stimulating discussions among the speakers and between them and the audience. Opportunity will be provided for the presentation of other views and experiences by audience participants. Attendees are encouraged to bring a viewgraph or two to describe their problems or their approaches to solutions.

Workshops

WSG: Noise Concepts in Microwave Systems

Date: Monday, June 10, 1991
Time: 8:00 a.m.—5:00 p.m.
Location: Room 305—Hynes Convention Center
Sponsors: MTT-14 Microwave Low Noise Techniques
MTT-16 Microwave Systems
Organizer: K.D. Breuer, AIL Systems Inc.
Speakers: B. Geller, COMSAT Laboratories, “Satellite Communication Systems”
R.E. Markle, AT&T Bell Laboratories, “Terrestrial Communication Systems”
L. Oliva, AIL Systems Inc., “Electronic Warfare Systems”
R. Pettai, Raytheon Company, “System noise and performance concepts”

Abstract:

The purpose of this workshop is to explore the performance limitations of microwave subsystems and systems due to noise and spurious signals. The intent is to provide a forum for interchange between microwave component designers and system designers stimulated by presentations by experts in satellite communications, terrestrial communications, radar and electronic warfare. The workshop will present a summary of noise concepts related to microwave systems, reviewing types of noise, noise sources, standards, analysis techniques, and generation of spurious signals. This will be followed by presentations on system performance evaluation factors (figures of merit) of various types of systems and how they are affected by noise and spurious signals. Included in the discussion will be transmission and reception considerations, antenna interface, frequency conversion, local oscillator noise, and baseband processing, including modulation and demodulation. The workshop will include the effect of component noise performance on system performance, and consider various types of signal modulations. State-of-the-art noise measurement techniques and microwave system evaluation techniques will also be discussed.

The workshop will be divided into a tutorial session with 45 minute presentations on system concepts and issues, followed by a panel session stimulated by short introductions by panel members.

The tutorial session will review types of noise and their sources within microwave systems, noise terminology, basic definitions, performance definitions, spurious signal generation, and saturation concerns. Performance considerations of microwave communication, radar and EW systems as affected by component noise and spurious signal performance will be presented. This will include the following:

- Receiver and transmitter noise and spurious signal analyses as well as examples of receiver and transmitter architectures and their dynamic range behavior.
- Sensitivity definitions and calculations such as signal-to-noise ratios, carrier-to-noise ratio, effective noise bandwidth, and equivalent antenna noise temperature.
- Noise and harmonics consideration in signal generation.
- Digital noise within microwave systems.
- Evaluation of performance as a function of signal types and modulations.

The panel session will provide an exchange on topics such as expected system performance due to state-of-the-art components performance, standards and definitions (standards for figure-of-merits), current computerized system analysis tools, and state-of-the-art performance assessment techniques.

Workshops

WSH: Amplifier Noise Measurements

Date: Monday, June 10, 1991
Time: 8:00 a.m.–5:00 p.m.
Location: Room 310—Hynes Convention Center
Sponsor: MTT-11 Microwave Measurements
Organizer: David F. Wait, National Institute of Standard and Technology (NIST),
formerly the National Bureau of Standards
Speakers: Vahe Adamian, Automatic Testing & Networking Inc.
Michael S.P. Lucas, Kansas State University
William A. Pastori, Maury Microwave Corporation
Sunchana Perera, NIST
Gary R. Simpson, Maury Microwave Corporation
Eric W. Strid, Cascade Microtech
David F. Wait, NIST

Abstract:

The recent emergence of low noise, broad band microwave systems, and the rapid developments of MMIC technology have increased the demand for accurate amplifier noise measurements. There have been significant advancements recently in the techniques for rapid, accurate measurement of amplifier noise. This workshop is tutorial in nature. It will emphasize the practical aspects of measuring amplifier noise. The workshop will cover the following topics:

- Fundamentals of noise
- Measurement instrumentation
- How to make noise figure measurements and estimate the uncertainty
- Four parameter amplifier noise measurements
- On-wafer amplifier noise measurements
- Uncertainties in on-wafer amplifier noise measurements
- The role of standards laboratories

Workshops

WSI: Solid State Power Amplifier Efficiency, MMIC & MIC

Date: Friday, June 14, 1991
Time: 8:00 a.m.—5:00 p.m.
Location: Room 310—Hynes Convention Center
Sponsors: MTT-6 Microwave and Millimeter-Wave Integrated Circuits
MTT-7 Microwave and Millimeter-Wave Devices
Organizers: Frank Sullivan, Raytheon Company
Gailon Brehm, Texas Instruments, Inc.
Fazal Ali, Pacific Monolithics, Inc.
John Kuno, Hughes Aircraft Company
Speakers: I. Bahl, ITT
B. Bayraktaroglu, Texas Instruments
Marvin Cohn, Westinghouse
Steve Cripps, Consultant
J. Huang, Raytheon
J.J. Komiak, General Electric
A. Platzker, Raytheon
Y.C. Shih, Hughes Aircraft
J.L. Vorhaus, Avantek

Abstract:

This workshop will focus on the state-of-the-art of microwave and millimeter wave solid state power amplifier efficiency. The amplifier efficiency that can be realized is of immense importance, since its value could well determine the amplifier feasibility in a given system. The emphasis will be primarily on MESFET, HBT, and PHEMT devices and amplifiers. The frequency range to be addressed will cover both microwave and millimeter waves. The session will summarize the device state-of-the-art efficiency and power levels of the various devices, will address tradeoffs among the devices, and will describe various circuit approaches to realizing amplifiers in both monolithic and hybrid format. Class of operation will also be discussed, along with the impact of operating bandwidth.

The goal of the workshop is to have an open exchange of the technology and to stimulate ideas for future efficiency improvements.

Workshops

WSJ: GaAs MMIC System Insertion and Multifunction Chip Design—Issues and Trends

Date: Friday, June 14, 1991
Time: 8:00 a.m.–5:00 p.m.
Location: Room 312—Hynes Convention Center
Sponsors: MTT-6 Microwave and Millimeter-Wave Integrated Circuits
MTT-16 Microwave Systems
Organizers: Fazal Ali, Pacific Monolithics
Ramesh Gupta, COMSAT
Raymond Pengelly, Compact Software
Inder Bahl, ITT-GTC
Speakers: Fazal Ali, Pacific Monolithics
Yalcin Ayasli, Hittite
Ramesh Gupta, COMSAT
Randy Lehmann, Texas Instruments
John Magarshack, Thomson CSF
Sanjay Moghe, Northrop
Don Parker, Hughes
Ray Pengelly, Compact Software
Bill Perkins, GE
Allen Podell, Pacific Monolithics
Larry Whicker, Westinghouse

Abstract:

Recent advances in GaAs MMIC technology are having a major impact on the architecture and operational capability of new microwave systems. MMIC insertion in electronic systems (radars, EW systems, communication satellites etc.) is shaping their performance, cost, size, weight, reliability and bandwidth capabilities. These developments have resulted in a shift from design of single function GaAs ICs to more complex multifunction MMICs offering higher levels of integration. From GaAs IC design perspective, trade-offs between bandwidth, performance, frequency, noise figure, output power, gain/insertion loss and port isolation of several functional blocks are critical. Insertion of these MMICs in practical systems presents major design challenges in overall system architecture definition, component selection and MMIC packaging. The intent of this workshop is to address emerging trends in various systems, multifunction chip design issues and process considerations by bringing together MMIC designers and system engineers with MMIC insertion experience. Topics of particular interest include, but are not limited to, the following areas:

- Design issues, system architecture and emerging trends for different systems.
- Partitioning of system functions using MMICs.
- MMIC design approaches for integrating several functions on a single chip.
- Modeling and system simulation of multifunction MMICs and performance tradeoffs.
- Integration of microwave and digital functions on the same chip.
- Techniques to optimize performance of multifunction chips and MMIC based systems.

Invited speakers with experience in multifunction MMIC design and system insertion will present tutorial papers covering these issues. Participants are encouraged to share their experience and views.

Workshops

WSK: High Power Microwave Systems

Date: Friday, June 14, 1991
Time: 8:00 a.m.—5:00 p.m.
Location: Room 313—Hynes Convention Center
Sponsors: MTT-5 High Power Microwave
MTT-16 Microwave Systems
Organizer: Jitendra Goel TRW/ESG
Speakers: Pablo Dana, Microwave Modules and Devices
Al Morse, Westinghouse
Bob Parker, NRL
Bob Regan, GTE
Don W. Reid, Los Alamos National Lab
Arye Rosen, David Sarnoff Research Center
Merald Schrader, Varian

Abstract:

This workshop is intended as a forum for exchange of ideas among those interested in generation and system applications of high power microwaves. It will consist of introductory invited presentations on:

- The overview of high power generation both in Solid State and Vacuum tube areas.
- High temperature, high power devices using silicon carbide technology.
- Low temperature technology using FET type devices.
- Klystron technology for high power pulsed systems.
- Application of high power devices in Communication, Radar and Commercial applications.
- Update on high power AGED committee report.
- High power generation and control by optical switching of semiconductors.

The invited speakers from their respective fields will present their view. It will be followed by five minute presentations from the participants. The audience will be strongly encouraged to explain their views and share their experience following each speaker.

Workshops

WSL: Computer Applications in Electromagnetic Education (CAEME)

Date: Friday, June 14, 1991
Time: 8:00 a.m.—5:00 p.m.
Location: Room 305—Hynes Convention Center
Sponsors: MTT-1 Computer-Aided Design
MTT-15 Microwave Field Theory
NSF/IEEE CAEME Center, University of Utah
Organizers: Barry S. Perlman, LABCOM, Ft. Monmouth, NJ (201) 544-4024
Magdy F. Iskander, University of Utah (801) 581-6944
Speakers: Prof. K.C. Gupta, University of Colorado
Prof. Tatsuo Itoh, University of Texas
Prof. Arthur Oliner, Polytechnic University
Prof. Markus Zahn, MIT

Abstract:

This workshop is the third in a series sponsored by CAEME. It will address issues related to the use of computational tools and state-of-the-art simulation and visualization technologies to enhance understanding of electromagnetic fields and their interactions and stimulate interest in the microwave profession. MTT-S is a sponsor of the CAEME Center.

A series of invited papers will be presented and many of the software development projects sponsored by CAEME will be demonstrated. Free copies of some of the CAEME software and educational copies of commercial software of some of the CAEME sponsors will be distributed to the workshop attendees.

Other presentations will be made by CAEME faculty and sponsors who will also demonstrate their software and describe its educational/training value. Various computer platforms, VCR, and TV monitors will be available for demonstration and swapping of software packages.

For more information, please contact one of the organizers.

Workshops

WSM: Design, Fabrication and Packaging of High Temperature Superconducting Microwave Devices

Date: Friday, June 14, 1991
Time: 8:00 a.m.–5:00 p.m.
Location: Room 309—Hynes Convention Center
Sponsor: MTT-18 Microwave Superconductor Applications
Organizers: Dr. M. Nisenoff
Prof. Dr. H. Chaloupka
Prof. M. Kobayashi
Speakers: R.R. Bonetti, COMSAT Laboratories
T. Itoh, University of California, Los Angeles
M.A. Janocko, and S.H. Talisa, Westinghouse S&T Center
H. Newman, Naval Research Laboratory
M. Schmidt and J. Bybokas, Superconducting Technology, Inc.

Abstract:

Since the discovery four years ago of superconductivity at temperatures above 77 K, the temperature of liquid nitrogen, there has been considerable interest in the exploitation of this new technology for the fabrication of passive, low loss microwave and millimeter wave devices, components and subsystems. This workshop will focus on the unique problems and issues that must be addressed by microwave engineers in the design, fabrication, packaging and testing of high temperature superconducting devices and components.

The opening session will consist of a series of invited talks which will address the following topics:

- Modeling of low loss HTS device structures.
- CAD of HTS microwave devices.
- Packaging issues associated with extremely low loss microwave devices.
- Testing of microwave devices at low temperatures.
- Cryogenic cooling of microwave devices: a microwave engineer's perspective.

These presentations will enable microwave engineers to appreciate the advances that have been achieved to date and the unique issues that must be addressed in the design of superconducting devices which are characterized by extremely low conductor losses.

Following these formal presentations, the floor will be open for informal presentations describing recent advances in microwave and millimeter wave HTS technology that did not make the MTT-S Symposium paper deadline. Authors of possible contributions should contact one of the workshop organizers.

Organizers:

Dr. M. Nisenoff, Naval Research Laboratory, Code 6850.1, Washington, D.C. 20375-5000, USA, Telephone: (202) 767-3099, FAX: (202) 767-0546

Prof. Dr. H. Chaloupka, Hochstfrequenztechnik, Bergische Universitat-GHS Wuppertal, Postfach 100 127, D-5600 Wuppertal 1, GERMANY, Telephone: (0202) 439-2938, FAX: (0202) 439-2864

Prof. M. Kobayashi, National Laboratory for High Energy Physics, Oho, Tsukuba, Ibaraki 305 JAPAN, Telephone: (0298 64-1171, FAX: (0298) 64-4051

Workshops

WSN: Spread Spectrum Technology in Consumer Electronics

Date: Friday, June 14, 1991
Time: 8:00 a.m.–5:00 p.m.
Location: Room 311—Hynes Convention Center
Sponsor:
Organizer: Sarjit Singh Bharj, Sarnoff Research Center
Speakers: S. Bharj, DSRC
Prof. D.J. Goodman, Rutgers University
Julius Knapp, F.C.C.
Kirby Mays, Avantek
Greg Nease, TBD Associates
Dr. Jim Omura, Cylink Inc.
Dr. Ray Simpson, OCI
Andrew Stewart, PA Consulting

Abstract:

Spread spectrum technology has been utilized by the military for secure command and control communications. A recent ruling of the Federal Communications Commission has made available three bands in the microwave spectrum for unlicensed commercial use, if signals generated at these frequencies do not exceed 1 watt and are broadcast using spread spectrum technology. On the industrial horizon few companies are available but new companies are forming at a rapid pace. The experts from this industry together with academic personnel will conduct presentations to highlight the methods and the technology used for such applications.

The discussions will cover the theoretical basics, the FCC specifications and the present and future applications. Issues such as the role of the silicon and gallium arsenide monolithic technologies will be addressed. Real time demonstration of the products will be conducted to highlight the importance of this technology.