

MTT-S IMS Workshops

The workshop format includes invited speakers discussing a variety of topics. Participation by the workshop attendees is encouraged by providing an adequate period of time after each invited talk for discussion pertaining to that talk. Attendees are encouraged to bring a few viewgraphs to assist in “making a point.”

WSMA: High T_c Superconductivity in Microwave Systems: A Technology Assessment

Date: June 14, 1993
Time: 8:00 AM–5:00 PM
Location: Room 202, GWCC
Sponsor: MTT-18 Microwave Superconductor Applications
MTT-16 Microwave Systems Technical Committee
Organizers: S. Jerry Fiedziuszko, Space Systems/LORAL
Klaus D. Breuer, AIL
Speakers: P. Ryan, USAF Wright Laboratories
M. Nisenoff, NRL
D. Goldstone, E-Systems
K. Breuer, AIL
R. Bonetti, COMSAT
M. Guglielmi, ESA ESTEC
R. Ross, JPL
M. Fidelson, Westinghouse

Abstract:

This workshop will address the emerging technology of high temperature superconductivity from the microwave system point of view. Several speakers from organizations involved in large microwave system programs will discuss tradeoffs of potential insertion of this technology. Applications in satellites, EW and other ground and air based systems will be presented. Workshop speakers will answer commonly asked systems questions, including: Does superconductivity make economic sense? Can the programs withstand the cost of cooling to 77°K? Is the technology mature and reliable enough for system insertion?

Workshops

WSMB: High Power Microwave Generation and Its Commercial Applications

Date: June 14, 1993
Time: 8:00 AM–5:00 PM
Location: Room 304, GWCC
Sponsor: MTT-5 High Power Microwaves
MTT-10 Biological and Medical Applications
MTT-16 Microwave Systems
Organizers: Jitendra Goel, TRW, Space Electronics Group
Don Reid, Los Alamos National Lab
William C. Brown, Microwave Power Transmission System

Abstract:

This workshop is intended as a forum for the exchange of ideas among those interested in generation and system applications of high power microwaves. During the past several years, and especially during the past year, the requirement for new or additional high power microwave devices, either tube or solid-state, for military applications has been steadily declining. New radar systems are almost nonexistent, and the competition from over-seas suppliers has substantially increased, which has caused companies that are supplying both devices and systems to look to developing commercial markets for their products. Considerable effort is being expanded to develop commercial applications of high power microwaves by national laboratories and private industry all around the world. This workshop will review new and potential commercial applications. It will consist of presentations on microwave requirements for high definition television, cellular telephone transmitters, solid-state FM transmitters, accelerator transmutation of nuclear and hazardous waste, medical applications, microwave heating, drying and processing of materials, and microwave power beaming.

Workshops

WSMC: Ultra Low Noise Microwave Sources

Date: June 14, 1993
Time: 8:30 AM–5:30 PM
Location: Room 305, GWCC
Sponsors: MMT-2 Microwave Acoustics
MTT-14 Microwave Low Noise Techniques
Organizers: Bruce McAvoy, Westinghouse STC
Bob Moore, Westinghouse ESG
James Whelehan, Jr., Eaton Corp.
Speakers: Art Ballato, USA Research Laboratory
Tom Parker, Raytheon Research Center
Gary Montress, Raytheon Research Center
Mike Driscoll, Westinghouse ESG
George Wagner, Westinghouse STC
Len Cutler, Hewlett-Packard

Abstract:

Low noise microwave sources are discussed in terms of the wide range of operational requirements that drive performance parameters, including short and long term stabilities vs. cost. Short term stabilities are driven by increasing requirements on slower moving target and lower radar cross section target detection requirements. Long term stabilities are driven by requirements for locator systems, communications synchronization and polystatic radar. With improvements in materials, crystal oscillators continue to play a major role in a wide variety of cost driven applications, as well as meeting key short term stability requirements. Innovative bulk geometries, such as high overtone resonators, make available higher Q materials that offer improved short term stability for room temperature operation over that available from quartz. With advances in cooling techniques, cryogenic sources that provide major short term stability improvement over room temperature are becoming attractive for most critical applications. Sapphire dielectric resonators with high temperature superconductor housings have demonstrated very favorable results.

Long term stability is provided by atomic standards, such as the rubidium cell, cesium cell and hydrogen maser. Again, practical considerations trade performance with cost and size. Currently, no atomic standard is small enough to fit into hand-held communications or locator equipment. This represents a critical need for widest use. Achieving both long and short term stability in a single source requires combining an atomic standard with a high Q resonator standard source.

Workshops

WSMD: Picosecond and Femtosecond Electromagnetic Pulses: Analysis and Applications

Date: June 14, 1993
Time: 8:30 AM–5:30 PM
Location: Room 306, GWCC
Sponsors: MTT-15 Microwave Field Theory
Organizers: Ingo Wolff, Duisburg University, Germany
Eikichi Yamashita, University of Electro-Communications, Japan
Speakers: D.H. Auston, Columbia University
M.J.W. Rodwell, University of California, Santa Barbara
J. Whitaker, University of Michigan, Ann Arbor
D. Jäger, Duisburg University, Germany
E. Yamashita, University of Electro-Communications, Japan
C.A. Balanis, Arizona State University
J.P.K. Gilb, Arizona State University
N.G. Alexopoulos, University of California, Los Angeles
H. Shigesawa, Doshisha University, Japan

Abstract:

Ultrafast electrical pulses with picosecond and sub-picosecond durations are finding steadily increasing applications, such as microwave and mm-wave generation, time-domain network analyzers and coherent microwave transient spectroscopy. Additionally, as clock rates increase and interline spacings decrease, an accurate analysis of pulse propagation in multiconductor coupled striplines becomes more and more important. Clock rates in the Gbit/s range with risetimes in the order of picoseconds are being considered, resulting in pulses that contain significant frequency components in the upper microwave region. For all these reasons, it will be very essential in the future to have available an analysis technique for pulse propagation on linear and nonlinear microwave lines of different geometrical shapes on the basis of an electromagnetic field theory.

This workshop will demonstrate the state-of-the-art of picosecond and femtosecond pulse excitation and propagation in different microwave environments. The emphasis of the workshop will be on pulse generation by means of optical or other techniques, and on the application of these pulses in microwave and mm-wave techniques; available techniques for describing the sub-picosecond microwave pulses on linear and nonlinear transmission lines and in high speed digital interconnects; and future developments for an accurate description of electromagnetic pulse propagation in microwave and mm-wave environments using electromagnetic field theory. The workshop will consist of keynote talks by experts who will present background material and current perspectives on the topics.

Workshops

WSME: Thermal Aspects of Microwave Device and Circuit CAD

Date: June 14, 1993
Time: 8:30 AM–5:30 PM
Location: Room 218, GWCC
Sponsors: MTT-1 Computer-Aided Design
Organizers: Walter R. Curtice, W.R. Curtice Consulting, New Jersey
Vittorio Rizzoli, University of Bologna, Italy
Speakers: Vittorio Rizzoli, University of Bologna
Lawrence Dunleavy, University of South Florida
Dale Dawson, Westinghouse
Lee Liou, WPAFB
Christopher Snowden, University of Leeds
P. Guillon, I.R.C.O.M.-URA
Jeanne Pavio, Texas Instruments
Ray Pengelly, Compact Software
Jeffrey Meyer, Hewlett-Packard Co., Inc.
Dan d'Almeida, Cascade Microtech Inc.
Lawrence Lerner, EEsof, Inc.
Peter Blakey, Silvaco

Abstract:

The importance of temperature effects on the performance of microwave devices and circuits is unquestionable. CAD tools must go beyond conventional electrical behavior and include all relevant thermal effects. Although thermal aspects in CAD are presently being investigated throughout the world, it is seldom treated systematically in technical meetings. This workshop will attempt to bring together widely scattered information, so as to give participants a clear understanding of the state-of-the-art knowledge on this subject and the future development needs.

The workshop consists of invited papers followed by a general discussion. The invited presentations consist of two types, including advanced research activities and CAD product activities as described by representatives of the microwave CAD software industry, who will discuss present and future capabilities of their products with regard to thermal effects.

Since it will be impossible to cover all relevant aspects of this intriguing subject in the invited presentations, contributions from the audience on specific topics will be welcome during the general discussion session.

Workshops

WSMF: Wireless Communications Via Lightwave

Date: June 14, 1993

Time: 8:00 AM–5:00 PM

Location: Room 219, GWCC

Sponsor: MTT-3 Lightwave Technology

Organizers: Winston I. Way, National Chiao-Tung University, Taiwan
Hiroya Ogawa, ATR Optical and Radio Communications Research Lab, Japan

Abstract:

Recently, many exploratory lightwave systems have been used to transport wireless communications signals, for example, voice, data and video. Two main areas for those applications are micro-cellular networks and line-of-sight local area network (LAN) systems. The purpose of this workshop is to stimulate discussions on various technical and economic aspects of these networks and systems. The topics proposed for discussions include practical hardware and network issues of using optical fiber technologies for digital/analog cellular signals and personal communications services (PCS); the role of optical fiber CATV networks in PCS; design considerations of optoelectronic components for microcellular and line-of-sight LAN systems; and spectrum and modulation technique considerations for a system combining radio and optical fibers.

WSMG: Mobile Communications Systems

Date: June 14, 1993

Time: 8:00 AM–5:00 PM

Location: Room 205, GWCC

Sponsor: MTT-16 Microwave Systems

Organizer: Bernard D. Geller, COMSAT Laboratories

Abstract:

This workshop will address mobile communications, an area of major current interest to the microwave community. Topics to be covered include evolving terrestrial systems, as well as satellite-based systems, including geostationary and low- and medium-earth orbit systems. An overview, a discussion of spectrum-allocation issues and presentations on new terrestrial mobile systems, as well as a presentation on satellite-based systems with an emphasis on organizations involved in this rapidly developing field will be included.

Workshops

WSMH: Filters and Multiplexers for Mobile Communications

Date: June 14, 1993
Time: 8:00 AM–12:00 PM
Locations: Room 215, GWCC
Sponsor: MTT-8 Filters and Passive Components
Organizers: R. Bonetti, COMSAT Laboratories
A. Williams, COMSAT Laboratories
Speakers: G. Zysman, AT&T Bell Laboratories, US
R. Bonetti, COMSAT Laboratories, US
K. Wakino, Murata Manufacturing Co., Japan
R. Peach, Comdev, Canada
R. Sakola, Motorola, US

Abstract:

With the emergence of personal wireless communications via cellular and satellite networks, great emphasis is being placed on minimizing the electrical loss and mass (volume) of filters and multiplexers used in handsets, high power base station transmitters and satellite repeaters. This workshop will focus on the current filter state-of-the-art as applied to mobile communications and on possible future technologies that may lead to improved electrical, mechanical and thermal filter characteristics.

WSMI: Material Measurements

Date: June 14, 1993
Time: 8:00 AM–12:00 PM
Location: Room 217, GWCC
Sponsor: MTT-II Microwave Measurements
Organizers: Ron Ham
John Barr
Speakers: Kathy Miyamoto, HP
David Blackham, HP
Claude Weild, NIST
Rick Moore, GTRI
Eddie Jacobs, Ft. Belvoir RD&E

Abstract

Characterization of material properties is a necessary step in the design of circuits, antennas, packages, anechoic chambers, camouflage material and stealth aircraft. Additionally, microwave measurements are used to determine indirectly industrial process parameters. This workshop begins with a tutorial presentation addressing general microwave material measurement techniques, followed by the introduction of measurement problems and applications in a directed interactive workshop session.

Workshops

WSMJ: Electromagnetic Wave Interaction with Water and Moist Substances

Date: June 14, 1993
Time: 1:00 PM–5:00 PM
Location: Room 217, GWCC
Sponsor: MTT-11 Microwave Measurements
Organizer: Andrzej Kraszewski, USDA-ARS
Speakers: Tapan Bose, University of Quebec, Canada
H.A. Buckmaster, University of Calgary, Canada
R. Jachowicz, Technical University of Warsaw, Poland
Ray King, KDC
A. Klein, Berthold Labs., Germany
Yves Leroy, Technical University of Lille, France
Stuart O. Nelson, USDA-ARS
Ebbe Nyfors, Radio Laboratory, Finland
P. Pissis, Technical University of Athens, Greece
P.N. Sen, Schlumberger Labs.
Ari Sihvola, Technical University of Helsinki, Finland
Charles W.E. Walker, Vancouver, Canada

Abstract:

Applications of microwave measurement techniques for determining the amount of water in moist substances have been explored for some time. This workshop will address the recent developments in both physical concepts and in technological means of practical implementation. The emphasis will be on the dielectric properties of water and wet materials at microwave frequencies and the prediction of the properties using dielectric mixture theories, the theory and practice of indirect multiparameter measurements, RF and microwave sensors and finally methods for density-independent moisture measurements.

This workshop is designed to stimulate discussion on the use of microwave theory and techniques for nonmilitary and noncommunication applications. Participants are encouraged to use viewgraphs in explaining their comments during the discussion.

Workshops

WSMK: Critical Issues in Experimental Validation

Date: June 14, 1993
Time: 8:00 AM–5:00 PM
Location: Room 307, GWCC
Sponsors: MTT-1 Microwave CAD
Automated RF Techniques Group (ARFTG)
Organizer: James C. Rautio, Sonnet Software Inc.
Speakers: Dan Swanson, Watkins-Johnson
John Bandler, McMaster University
Achim Hill, Compact Software
Brain Hughes, HP
James C. Rautio, Sonnet Software Inc.
Andy Peterson, Georgia Institute of Technology
Glenn Hopkins, Georgia Institute of Technology

Abstract:

While microwave and electromagnetic software have seen tremendous growth in the last decade, experimental techniques have failed to keep pace. At the present time state of the art in experimental validation and error analyses are rarely if ever performed. In addition, validations rarely carry credibility across more than the group that performs the validation, forcing each group that needs validation of a particular analysis to repeat the validation. This workshop will expand upon issues of proper experiment design, error and sensitivity analysis, experimental significance and experimental objective. This workshop is a continuation of the panel session of the same title at the 1992 MTT Symposium.

Characterization of material properties is a necessary step in the design of circuits, antennas, packages, anechoic chambers, camouflage material and stealth aircraft. Additionally, microwave measurements are used to determine indirectly industrial process parameters. This workshop begins with a tutorial presentation addressing general microwave material measurement techniques, followed by the introduction of measurement problems and applications in a directed interactive workshop session.

Workshops

WSFA: Microwave HBTs and HEMTs: Circuit Applications and Reliability

Date: June 18, 1993
Time: 8:00 AM–5:00 PM
Location: Bonn and London, Marriott Marquis
Sponsor: MTT-6 Microwave and mm-Wave Integrated Circuits
Organizers: Fazal Ali, Westinghouse-ATL
Aditya Gupta, Westinghouse- ATL
Burhan Bayraktaroglu, Wright-Patterson Lab
Speakers: John Huang, Raytheon
Louis Liu, TRW
Phil Smith, GE
Hiroshi Kondoh, HP
Ali Khatibzadeh, TI
Aaron Oki, TRW
P.C. Chao, GE
Dale Dawson, Westinghouse-ATL
H. Hartnagel, University of Darmstadt, Germany
Kajuhiko Honjo, NEC, Japan
Peter Topham, GEC-Marconi, UK
C. Aitchison, Brunel University, UK
A. Higgins, Rockwell
D. Pons, Thomson, France
A. Colquhoun, Siemens, Germany

Abstract:

GaAs heterojunction bipolar transistors (HBT) and high electron mobility transistors (HEMTs) are emerging as key technologies for precision analog/digital circuits, power amplifiers, low phase-noise oscillators, low noise amplifiers, frequency converters, multifunction MMICs, frequency dividers and mm-wave circuits. The purpose of this workshop is to bring to participants the latest information on the microwave and mm-wave circuit applications of HBTs and HEMTs. Various circuit and system insertion examples will be presented and discussed. In addition, invited speakers will share their findings about the reliability of these devices and implications for system insertion.

Workshops

WSFB: Combined Self-Consistent Particle Transport Simulation and Full Wave Dynamic Field Simulation for Monolithic Solid-State Device and Circuit Calculations

Date: June 18, 1993
Time: 8:00 AM–5:00 PM
Location: Salon III, Marquis Ballroom
Sponsors: MTT-6 Microwave and mm-Wave Integrated Circuits
MTT-7 Microwave and mm-Wave Devices
MTT-15 Microwave Field Theory
Organizer: Clifford M. Krowne, Naval Research Laboratory
Speakers: V. Tripathi and S. Goodnick, Oregon State University
K. Webb, S. Datta and M. Lundstrom, Purdue University
R. Ziolkowski, University of Arizona
S. El-Ghazaly, Arizona State University
N. Goldaman, University of Maryland, College Park
C. Moglestue, Fraunhofer Institute of Applied Solid-State Physics, Germany
H. Grubin and J. Kreskovsky, Scientific Research Associates
U. Ravaioli, Beckman Institute, University of Illinois
C. Lent, University of Notre Dame
F. Buot, R. Salvino, C. Krowne, and K. Jensen, NRL
M. Feng, University of Illinois

Abstract:

This workshop will foster the development of computer codes that are user friendly and that allow the modeling of solid-state devices interacting with electromagnetic fields so that a nonlinear self-consistent numerical simulation occurs, which simultaneously accounts for the microscopic transport equations (Boltzmann, Monte Carlo or many-body) and the classical electromagnetic Maxwell field equations. Limitations of the classical field equations and the necessary use of quantized field equations will also be treated. The various theoretical methods and numerical algorithms are to be considered. All participants should bring viewgraphs to share. A group of invited speakers, expert in the areas to be discussed, will be present.

Workshops

WSFC: EM Modelling of Microwave Packages and Interconnects

Date: June 18, 1993
Time: 8:30 AM–4:30 PM
Location: Salon IV, Marquis Ballroom
Sponsors: MTT-1 Computer-Aided Design
MTT-15 Microwave Field Theory
MTT-12 Microwave and mm-Wave Packaging
Organizers: K.C. Gupta, University of Colorado, Boulder
Barry Perlman, US Army ETDL
Speakers: Raj Mittra, University of Illinois
Bob Jackson, University of Massachusetts
Matthias Rittweger, University of Duisburg, Germany
Shigeki Takeda, Kyocera Corp., Japan
Panelists: Martin P. Goetz, StratEdge Corp.
Bert Berson, Berson & Associates

Abstract:

As microwave designs increase in complexity and digital designs are operated at higher and higher speeds, the design of packages and interconnects becomes more and more critical to the subsystem performance. This workshop will provide a forum to discuss how electromagnetic analysis and modeling techniques can be employed for package and interconnect designs.

A tutorial overview of the state of the art will be presented. A panel discussion and an open forum will also be included. The panel discussion will emphasize applications of electromagnetic field simulation for package designing. For the open forum, participants are encouraged to bring one or two viewgraphs to express their viewpoints and to contribute to the workshop discussions.

Workshops

WSFD: The Art of Designing Power MMICs

Date: June 18, 1993
Time: 8:00 AM–5:00 PM
Location: Salon A, Imperial Ballroom, Marriott Marquis
Sponsors: MTT-15 Microwave Field Theory
MTT-6 Microwave and mm-Wave Integrated Circuits
MTT-1 Computer-Aided Design
Organizers: Arvind K. Sharma, TRW/ESG
Tatsuo Itoh, University of California, Los Angeles

Abstract:

Recent advances in GaAs materials, processing and device technology have made power monolithic microwave integrated circuit (power MMIC) technology feasible for various military, space and commercial communication systems. In these applications, monolithic power amplifiers extensively utilize heterojunction bipolar transistors (HBT) at microwave frequencies in addition to MESFETs, and high electron mobility transistors (HEMT) at mm-wave frequencies. However, the successful development of power MMIC depends on the quality and reproducibility of the material properties, tighter process control, accurate characterization and the modeling of active devices under extreme operating conditions.

The design of a monolithic power amplifier depends considerably on the empirical device models and heuristic design procedures. It requires careful consideration in the areas of processing, device characterization and modeling, circuit simulation, combiner design, module assembly, thermal packaging and testing. Appropriate design methodologies are required to achieve maximum performance in terms of the prescribed power, gain and efficiency.

In-depth tutorial discussions, as well as state-of-the-art reviews on monolithic power amplifier design techniques, including planar and waveguide power combining techniques; experimental characterization of active devices; and nonlinear device modeling, including parameter extraction and determination of optimum loads, will be discussed for MESFETs, HEMTs and HBTs. In addition, the workshop will focus on design methodologies and producibility aspects of monolithic power amplifiers.

This workshop will stimulate those uninitiated in the area, and also provide a forum for discussions for those already familiar with it. It will provide a forum for discussions on current bottleneck issues, possible solutions and future directions on the design of monolithic power amplifiers at microwave and mm-wave frequencies.

Workshops

WSFE: Civil Microwave Packaging

Date: June 18, 1993
Time: 8:00 AM–12:00 PM
Location: Sydney Room, Marriott Marquis
Sponsors: MTT-12 Microwave and mm-Wave Packaging
Organizers: Bert Berson, Berson & Associates
Douglas Maki, Raytheon

Abstract:

As the microwave industry moves aggressively, albeit somewhat awkwardly, toward commercial applications, the military oriented packages are becoming too expensive and the available plastic packages are limiting in performance. This workshop will investigate new approaches to inexpensive packaging for civil applications. Topics to be covered include modeling and reduction of parasitics; heatsinking, grounding and hermeticity considerations in plastic packages; low cost ceramic packaging techniques; microwave TO-X packages; wafer based fabrication for microwave packages; and novel materials for low cost packaging. Attendees are encouraged to bring a viewgraph or two to describe work ongoing at their facility.

Workshops

WSFF: System Implications of Atmospheric Transmission Effects

Date: June 18, 1993
Time: 8:00 AM–12:00 PM
Location: Summit Room, Marriott Marquis
Sponsors: MTT-16 Microwave and Communications Systems
Organizers: R.W. McMillan, Georgia Tech Research Institute
A.C. VanderVorst, U.C. Louvain-la-Neuve, Belgium
Speakers: C. Gibbins and J. Norbury, Rutherford Appleton Lab., UK
H. Meinel, Deutsche Aerospace, Germany
D. Vanhoenacker, U.C. Louvain-la-Neuve, Belgium
Three U.S. Speakers

Abstract:

Atmospheric measurements have been made worldwide for 20 years, and atmospheric models have been derived from the measurements. Systems have been designed, taking those models into consideration.

This workshop concentrates on system applications, with an emphasis on mm-wavelengths. Three presentations from Europe will describe mm-wave systems, in particular at 60 GHz, the European effort in propagation studies at frequencies above 20 GHz, and the effect of atmospheric turbulence on communications links on theoretical developments. Presentations by US speakers will cover other system applications.