

Conference Program

2026 International Conference on Electromagnetic Engineering & Microwave Systems (www.iceems.org)

June 24-26, 2026
Chengdu, China

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Welcome Message

It is our great pleasure to welcome you to the 2026 International Conference on Electromagnetic Engineering & Microwave Systems (EEMS 2026), to be held in Chengdu, China, from June 24 to 26, 2026. This event serves as a vibrant forum for international experts and scholars from diverse fields to connect, share insights on emerging developments, and collaborate on forward-looking solutions in electromagnetic engineering and microwave systems. A very warm welcome to every one of you!

EEMS 2026 is sponsored by the Sichuan Institute of Electronics, technically co-sponsored by IEEE, and supported by the University of Electronic Science and Technology of China, Sichuan University, Southwest Jiaotong University, Chengdu University of Technology, and Chengdu University of Information Technology. The conference is designed to foster cross-disciplinary dialogue and collaboration between academic researchers and industry practitioners worldwide, bridging theoretical advances with practical applications. The program will feature keynote speeches, invited talks, as well as oral and poster sessions-making EEMS 2026 an energetic and inspiring event.

Organizing a successful conference takes the collective efforts of many. We extend our heartfelt thanks to all committee members, whose indispensable hard work has been vital in shaping and promoting this event. Our gratitude also goes to the authors who entrusted us with their research and worked closely with the organizing committee. This year, we accepted 58 submissions. We are extremely grateful to the members of the Technical Program Committee for their thorough review process and the countless hours they dedicated to evaluating each submission.

Finally, we thank every delegate for joining us in Chengdu. We hope your time here is both academically rewarding and culturally memorable. While you are in this beautiful city, we encourage you to experience its unique charm-whether visiting the adorable giant pandas, savoring authentic Sichuan hotpot and local cuisine, or relaxing in a traditional teahouse. May your stay in Chengdu be as inspiring as the conference itself, and we look forward to welcoming you back again next year!

Conference Chairs

Kama Huang, Sichuan University, China

Yikai Chen, University of Electronic Science and Technology of China, China

Useful Information

Conference Venue

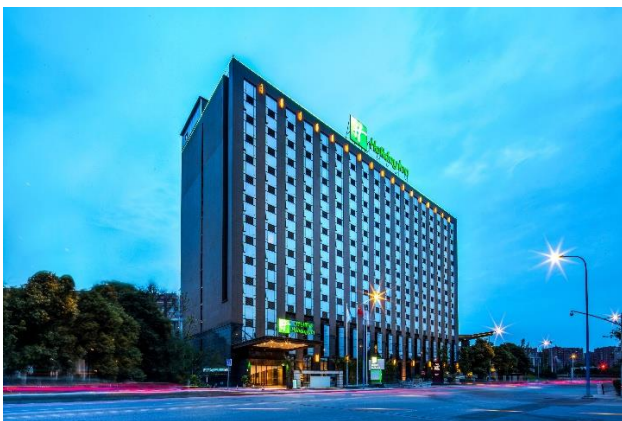


新希望高新皇冠假日酒店 / Crowne Plaza Chengdu West

地址：四川省成都市高新西区西芯大道1号 成都, 四川 610041 中国

Addr: No.1 Xixin Avenue, High-Technology West Zone Chengdu, 51 610041 Mainland China

Accommodation Hotel



成都新希望高新中心假日酒店

地址：四川省成都市高新西区西芯大道1号附1号（距离会议酒店步行约5分钟）

会议协议优惠价：

高级大床 380 元/晚（入住 1 人含单早，入住 2 人含双早）

预定方式：扫码注册会员，选择入住时间（如预定时间在 6 月 24-26 日期间以外，请联系会务组后预订）

入住前 2 天 18:00 前可免费取消，预订需要提前支付第一晚的房费担保



Time Zone:

UTC/GMT+8

Average Temperature of Chengdu in June

Average daily minimum temperature

14°C

Average daily maximum temperature

22°C**Bank and Foreign Exchange**

The Currency is Chinese Yuan here

Important Phone Numbers

Fire: 119

Medical Emergency: 120

Police: 110

Important Notes

- ✧ Please take care of your belongings during the conference. The conference organizer does not assume any responsibility for the loss of personal belongings of the participants.
- ✧ Please wear delegate badge during the conference. There will be NO access for people without a badge. Never discard your badge at will.
- ✧ Accommodation is not provided. Early reservation is suggested to be made for delegates.
- ✧ Please show the badge and meal coupons during lunch and dinner.
- ✧ Don't stay too late in the city and don't be alone in the remote area. Be aware of the strangers who offer you service, signature of charity, etc., at scenic spots. More Tourist Information and Security tips are available online.

Presentation Instruction

Materials Prepared by the Presenters

✧ **Oral Presentation: PPT or PDF Display File**

PPT Template: www.iceems.org/kits.zip

✧ **Poster Presentation: Poster 80cm*180cm (height>width), Portrait Format, Dig holes at each corner**

Poster Template: www.iceems.org/kits.zip

Duration of Each Presentation

- ✧ Keynote Speech: 40 Minutes of Presentation including Q&A.
- ✧ Invited Speech: 20 Minutes of Presentation including Q&A.
- ✧ Regular Oral Presentation: 15 Minutes of Presentation including Q&A.
- ✧ Poster Presentation: 6 Minutes of Presentation including Q&A

Notes

- ✧ The regular oral presentation time arrangement is for reference only. In case any absence or some presentations are less than 15 minutes, please join your session before it starts.
- ✧ An excellent presentation will be selected from each session which will be announced and awarded an excellent presentation certificate.

Keynote Speaker I

10:00-10:40, June 25, 2026, Thursday-- GMT+8, Beijing Time

Meeting Room: 国槐梧桐厅, 1st Floor



Prof. Zhongxiang Shen

Fellow of IEEE

Yangtze Delta Region Academy of Beijing Institute of Technology, Jiaxing, China

Speech Title: Electromagnetic Selective Structures: Concept and Design

Abstract: In this talk, we intend to provide a brief overview of electromagnetic selective surfaces/structures (EMSS). According to the properties of an incident electromagnetic wave, EMSS can be divided into four categories: frequency-selective structure (FSS), polarization-selective surface (PSS), angle-selective surface (ASS), and energy-selective surface (ESS). Recent developments and advances in the design of EMSS will also be briefly introduced. Finally, future opportunities in the areas of the design and analysis of EMSS will be suggested.

Bio: Zhongxiang Shen (M'98–SM'04–F'17) received the B.Eng. degree in electrical engineering from the University of Electronic Science and Technology of China, Chengdu, China, in 1987, the M.S. degree in electrical engineering from Southeast University, Nanjing, China, in 1990, and the Ph.D. degree in electrical engineering from the University of Waterloo, Waterloo, ON, Canada, in 1997.

From 1990 to 1994, he was with the Nanjing University of Aeronautics and Astronautics, Nanjing. In 1997, he joined Com Dev Ltd., Cambridge, ON, as an Advanced Member of Technical Staff. In 1998, he was a Post-Doctoral Fellow first with the Gordon McKay Laboratory, Harvard University, Cambridge, MA, USA, and then with the Radiation Laboratory, University of Michigan, Ann Arbor, MI, USA. From Jan. 1999 to Dec. 2023, he was a faculty member (Assistant Professor, Associate Professor and Full Professor) of Nanyang Technological University, Singapore. He is now a Strategic Scientist at Yangtze Delta Region Academy of Beijing Institute of Technology, Jiaxing, Zhejiang, China. He has authored or coauthored more than 240 journal papers (among them 180 were published in IEEE journals) and presented more than 200 conference papers. His current research interests include the design of small and planar antennas for various wireless communication systems as well as analysis and design of electromagnetic-selective structures.

Prof. Shen served as the Chair of the IEEE MTT/AP Singapore Chapter in 2009. He was the Chair of the IEEE AP-S Chapter Activities Committee from 2010 to 2014. He served as the Secretary of the IEEE AP-S from Jul. 2014 to Dec. 2018 and was an elected AdCom member of the IEEE AP-S from Jan. 2017 to Dec. 2019. He was a Distinguished Lecturer of the IEEE AP-S from Jan 2021 to Dec. 2023. He is currently the Editor-in-Chief of IEEE Open Journal of Antennas and Propagation.

Keynote Speaker II

11:10-11:50, June 25, 2026, Thursday-- GMT+8, Beijing Time

Meeting Room: 国槐梧桐厅, 1st Floor



Prof. Jiancao Hou

Sichuan University, China

Speech Title: Multi-objective microwave wireless power transfer - the energy cornerstone of 6G-enabled intelligent everything

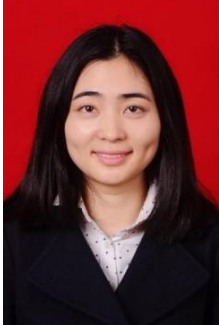
Abstract: As mobile communication technology evolving from 5G-A to 6G, 6G is expanding the boundaries of microwave wireless communication capabilities and truly realize the various intelligent sensing and immersive interaction applications, achieving 6G-enabled Intelligent Everything? The vision of supporting trillions of wireless devices for intelligent mutual connectivity is facing a fundamental but extremely important challenge of energy supply. Multi-objective microwave wireless power transfer is one of the key technologies that can empower the development of this requirement. This talk will focus on the design of a multi-objective microwave wireless power transfer system. Starting from a brief introduction of the basic principles of microwave wireless power transfer, spatial matching theory, and the current development status around the world, this talk will conduct a feasibility analysis of developing a multi-objective microwave wireless power transfer system via hybrid beamforming at mmWave. Meanwhile, suggestions will be given regarding the development of key technologies.

Bio: Dr Jiancao Hou is a full Professor at College of Electronics and Information Engineering, Sichuan University. He received his Ph.D. degree from the University of Surrey in the U.K. He is a senior member of IEEE. He has been engaged in fundamental research and innovative applications in areas of microwave wireless power transfer, digital beamforming, and ultra-wideband signal processing technologies. He has published over 20 papers in international journals and conference proceedings, and has applied for and/or obtained more than 30 patents in the U.S. and China. Additionally, he has led and participated in projects including the EU Horizon 2020 research projects, the U.K. Natural Fund Council (EPSRC) research projects, the National Key Research and Development Programs of China, Provincial Major Science and Technology projects, and etc.

Keynote Speaker III

13:30-14:10, June 25, 2026, Thursday-- GMT+8, Beijing Time

Meeting Room: 国槐梧桐厅, 1st Floor



Prof. Mei Li

Chongqing University, China

Speech Title: Beam Control in High-Efficiency Compact Planar Antennas

Abstract: With the ongoing miniaturization and integration of wireless systems (e.g., terminal devices, base stations, and vehicle platforms), and the increasingly stringent demands on electromagnetic performance, efficient beam control in compact planar antennas has become a critical research direction. Conventional approaches, such as using feed networks to impose specific amplitude and phase distributions across radiating elements, can achieve beam broadening, gain enhancement, or beam tilting. However, due to their additional feed networks, array antennas often suffer from increased footprint, higher insertion loss, reduced bandwidth, and higher cost. In space-constrained platforms, where the available real estate continues to shrink while radiation requirements grow, there is an urgent need for compact, high-efficiency, and broadband antennas with tailored beam behavior. To address these challenges, this talk focuses on beam control techniques for compact planar antennas. Specifically, I will present our recent progress on compact, broadband, high-efficiency antennas based on near-field coupling mechanisms. Emphasis will be placed on how to efficiently control excitation amplitude, phase, and polarization within the compact parasitic coupling array configuration.

Bio: Dr Mei Li is a full Professor at the School of Microelectronics and Communication Engineering, Chongqing University, and a Senior Member of IEEE. She received her Ph.D. degree from the University of Electronic Science and Technology of China (UESTC) in 2016. She conducted academic visits at the University of California, San Diego (UCSD), USA, and the University of Macau.

Her research interests include miniaturized planar antennas, antenna arrays based on periodic/quasi-periodic structures, and related areas. She has published over 100 peer-reviewed papers. She has been recognized as a recipient of the National Young Talent Program, a New Chongqing Young Innovative Talent, and a Reserve Candidate for Academic and Technical Leader of Chongqing. She received the Young Scientist Award from the International Applied Computational Electromagnetics Society (ACES) in 2019 and won the First Prize from the China Association of Inventions in 2022.

Keynote Speaker IV

14:10-14:50, June 25, 2026, Thursday-- GMT+8, Beijing Time

Meeting Room: 国槐梧桐厅, 1st Floor



Assoc. Prof. Chuan Lin

Southwest Jiaotong University, China

Speech Title: Theory and Practice of Near-Field Millimeter-Wave Imaging for Human Security Screening

Abstract: Millimeter-wave imaging is a key technology for next-generation security screening, playing an important role in public safety. This talk presents a systematic overview of the theory and practice of near-field millimeter-wave imaging for human security inspection. We first introduce the fundamental imaging mechanisms and representative reconstruction methods in active systems. To address challenges in system cost and acquisition efficiency, we then discuss imaging frameworks based on sparse sampling and array design. Furthermore, hybrid reconstruction approaches that integrate physics-consistent models with data-driven methods are highlighted to improve imaging quality and efficiency. Finally, we explore automatic target detection and recognition techniques, with particular emphasis on robust identification of unknown objects. This talk aims to bridge theory and practice, providing insights for developing efficient, accurate, and intelligent millimeter-wave security imaging systems.

Bio: Chuan Lin was born in Fuzhou, China, in 1980. He received the B.Eng. and Ph.D. degrees from Southwest Jiaotong University, Chengdu, China, in 2003 and 2010, respectively. He joined the Southwest Research Institute of Electronic Equipment, Chengdu, China, as an Engineer, in April 2010, and a Senior Engineer in 2012. From May 2013 to April 2017, he was an Associate Professor with the University of Electronic Science and Technology of China, Chengdu. He is currently an Associate Professor with Southwest Jiaotong University, Chengdu. His research interests include microwave imaging, machine learning, intelligent detection, and computational intelligence.

Invited Speaker I

17:10-17:30, June 25, 2026, Thursday-- GMT+8, Beijing Time

Meeting Room: 国槐厅, 1st Floor



Prof. Kwok L. Chung

Stanford/Elsevier World's Top 2% Scientist

Guangzhou Institute of Science and Technology, China

Speech Title: Advanced Materials for Flexible Antennas and Sensors: A Focus on Conformal Dielectrics and a Strain Sensor Implementation

Abstract: With the rapid development of flexible electronic technologies, flexible antennas and sensors are moving toward lightweight, conformal design and multifunctional integration. Flexible conductive and dielectric materials have achieved remarkable breakthroughs and diversified development in fundamental research and applications. This paper reviews recent advances in materials for flexible antennas and sensors, analyzes key challenges in preparation, performance optimization, and device integration, and presents a practical implementation of a dual-axis antenna-based strain sensor using RT/duroid 5880. It aims to provide theoretical guidance and strategic insights for flexible electromagnetics research and engineering applications.

Bio: Prof. Kwok L. Chung is a Senior Member of IEEE. He graduated with integrated bachelor-doctoral program as a First-Class Honors graduate from the University of Technology Sydney, Australia. He has been listed among the World's Top 2% Scientists by Stanford University for six consecutive years. His works have gained 4300 citations in Scopus with an h-index of 38. He once served as Associate Editor of IEEE Access and Alexandria Engineering Journal, and was awarded the Outstanding Associate Editor Award of IEEE Access in 2019. He founded and presided over IEEE Qingdao Joint Chapter, and has long been engaged in international conference organization and academic services.

His main research interests cover antennas, sensors, electromagnetic perception and multi-sensor fusion. He has published more than 100 high-quality papers in journals including IEEE TAP, MTT and TVT. Recently, his team's research achievement was selected as a Featured Highlight Paper in IEEE TAP.

Invited Speaker II

15:10-15:30, June 25, 2026, Thursday-- GMT+8, Beijing Time

Meeting Room: 香樟厅, 1st Floor



Prof. Zhengming Tang

China West Normal University, China

Speech Title: Key Technologies and Applications of Microwave Efficient Heating and Precise Control

Abstract: This study presents a systematic framework to optimize industrial microwave heating through advancements in energy generation, transmission, and load matching. To address the low efficiency of traditional magnetrons, a six-element composite cathode is developed, increasing the microwave conversion efficiency to 69.1%. In the transmission stage, an integrated circular waveguide structure is utilized to minimize energy loss. Furthermore, an optimized frequency selection mechanism ensures sustained energy coupling under dynamic load conditions. Experimental results demonstrate that the proposed system achieves a microwave absorption rate of 95.21%, compared to 35.19% for static fixed-frequency systems. In industrial applications involving fluorine rubber dehydration, the drying cycle is substantially shortened, with the final moisture content successfully reduced to trace levels. These findings confirm the viability of the optimized architecture for high-performance and energy-intensive industrial processing.

Bio: Dr. Zhengming Tang is the Vice Dean of the School of Electronic Information Engineering and a full Professor at China West Normal University. He received his Ph.D. degree in Communication and Information System from Sichuan University. He is a member of the Microwave Energy Chemical Engineering Application Committee of the Chinese Chemical Society and the Sichuan Microwave Energy Application Committee. His research interests include wireless communication, electromagnetic compatibility, and microwave theory and technology. He has presided over or participated in more than 20 national and provincial research projects, published over 60 academic papers (50+ indexed by SCI/EI/ISTP), and holds 4 granted national invention patents.

Invited Speaker III

16:45-17:05, June 25, 2026, Thursday-- GMT+8, Beijing Time

Meeting Room: 香樟厅, 1st Floor



Assoc. Prof. Yi Chen Zhong

Xidian University, China

Speech Title: Advancements in 2-Bit Programmable Metasurface Antennas: From Polarization Insensitivity to Highly Integrated Multipolarization Beam Scanning

Abstract: Programmable metasurface antennas (PMAs) and reconfigurable intelligent surfaces (RIS) are crucial for next-generation communications, yet achieving high aperture efficiency and multi-polarization with simplified structures remains challenging. This academic talk presents two recent advancements in 2-bit PMAs. First, we introduce an S-band programmable reflectarray antenna (PRA) that minimizes p-i-n diodes and utilizes a slotted polygon patch to suppress cross-polarization, achieving a polarization-insensitive metasurface with a 31.20% maximum aperture efficiency. Second, we propose a highly integrated, dual-polarized metasurface antenna that embeds the DC control circuit directly behind the surface, eliminating external wires. It supports $\pm 60^\circ$ wide-angle beam scanning for dual-linear and dual-circular polarizations using a single linearly polarized feed, reaching 35.35% efficiency. Combining the advantages of low cost, structural simplicity, and high aperture efficiency, these proposed antennas demonstrate significant potential for diverse applications, including satellite communications, radar detection, and RIS-assisted networks.

Bio: Yi Chen Zhong was born in Chengdu, Sichuan, China, in 1990. He received the B.E. and Ph.D. degrees from the University of Electronic Science and Technology of China (UESTC), Chengdu, China, in 2013 and 2020, respectively. He is currently an Associate Professor with Xidian University. From 2017 to 2019, he was an Honorary Associate with the Department of Electrical and Computer Engineering, University of Wisconsin-Madison, USA.

His research interests broadly encompass near-field and far-field converged antennas, metasurfaces including reconfigurable intelligent surfaces (RIS), and high-density integrated phased arrays. He has published over 30 peer-reviewed papers, including 13 in the prestigious IEEE Transactions on Antennas and Propagation (IEEE TAP).

Invited Speaker IV

15:40-16:00, June 25, 2026, Thursday-- GMT+8, Beijing Time

Meeting Room: 梧桐厅, 1st Floor



Associate Research Fellow Yunpeng Zhang

**University of Electronic Science and Technology of China,
China**

Speech Title: Test Method of Electromagnetic Shielding Effectiveness of Transparent Conductive Films Based on Coaxial Resonant Cavity

Abstract: With the wide application of transparent conductive films (TCFs) in the field of electromagnetic shielding, the demand for in-situ evaluation of their electromagnetic performance in the installed state has become increasingly urgent. The existing method is only applicable to the uninstalled state and cannot meet the in-situ testing requirements of the installed TCF. To address this limitation, a single-sided in-situ testing sensor based on a coaxial resonant cavity is proposed. It can measure the microwave surface resistivity of the TCF and further derive the electromagnetic shielding effectiveness (SE). The sensor operates in S and C bands. Test results for ITO films indicate that the SE test range of the sensor covers 25-55 dB, and the test accuracy is better than ± 2 dB.

Bio: Yunpeng Zhang was born in Yunnan, China, in 1990. He received the B.S. degree in electromagnetic field and wireless technology and the Ph.D. degree in electromagnetic field and microwave technology from University of Electronic Science and Technology of China (UESTC), Chengdu, China, in 2013 and 2019, respectively. From 2020 to 2022, he was a Postdoctoral Fellow at UESTC. He is currently an Associate Research Fellow with the School of Electronic Science and Engineering, UESTC. His current research interests include material electromagnetic parameters measurement and microwave non-destructive testing.

He has presided over more than 10 projects, including the National Key R&D Program of China, the National Natural Science Foundation of China, and the China Post-Doctoral Science Foundation. He has published over 20 papers in SCI journals such as IEEE TAP, IEEE TMTT as the first or corresponding author, and has obtained over 40 invention patents and 4 group standards. He serves as a member of the TC01 Technical Committee within the CSTM Electronic Materials Field Committee, and has been awarded the Bronze Award in China Postdoctoral Innovation and Entrepreneurship Competition and the Young Scientist Award in the 4th Microwave Energy Chemical Application Conference.

Invited Speaker V

15:20-15:40, June 25, 2026, Thursday-- GMT+8, Beijing Time

Meeting Room: 梧桐厅, 1st Floor



Associate Research Fellow Chong Gao

**University of Electronic Science and Technology of China,
China**

Speech Title: High sensitivity test of dielectric properties of electromagnetic functional fibers

Abstract: Functional composite materials and devices made from fibers, such as those with wave-transparent, stealth and shielding properties, are widely used in various key fields, such as radomes, wearable devices and PCB substrates. As a key raw material for composite materials and devices, the dielectric properties of electromagnetically functional fibers directly influence the overall performance. In previous research, direct testing of the dielectric properties of individual fibers or fiber bundles has been rare, primarily due to the high sensitivity requirements that conventional test setups struggle to meet. To address this issue, a semi-cylindrical cavity incorporating a metal ridge structure has been proposed. This design offers excellent testing sensitivity even for individual fiber filaments, whilst also delivering highly effective results for testing the dielectric properties of fiber bundles. This testing method and structure are of significant importance for the control and inspection of the electrical properties of electromagnetic functional fiber materials.

Bio: Chong Gao was born in Shanxi, China, in 1993. He received the Ph.D. degree in electromagnetic field and microwave technology from University of Electronic Science and Technology of China (UESTC), Chengdu, China, in 2020. From 2020 to 2023, he was a Postdoctoral Fellow at UESTC. He is currently an Associate Research Fellow with the School of Electronic Science and Engineering, UESTC.

His current research interests include electrical performance test of materials/components, design of the microwave detection sensors and systems. He has published more than 30 papers, including IEEE TMTT, IEEE TIM, and has applied for over 40 Chinese invention patents. He has presided over more than 10 projects, including the National Natural Science Foundation of China, the China Post-Doctoral Science Foundation, and others. He served as the workshop chair of the international conferences for several times.

Invited Speaker VI

15:20-15:40, June 25, 2026, Thursday-- GMT+8, Beijing Time

Meeting Room: 国槐厅, 1st Floor



Associate Research Fellow Junhui Yin

University of Electronic Science and Technology of China, China

Speech Title: Unstructured Mesh Generation Techniques for Computational Electromagnetics

Abstract: In the design of electronic products, electromagnetic simulation plays a crucial role. Mesh generation is a key step in electromagnetic simulation, and the quality of the mesh directly determines the accuracy, efficiency, and even the success of subsequent computations. In recent years, as electromagnetic targets and environments have become increasingly complex, the requirements for model processing have continued to grow. However, mesh generation in electromagnetic simulation still largely relies on general-purpose commercial software, which makes local refinement and integrated optimization inconvenient. This report introduces an unstructured mesh generator for electromagnetic industrial software, namely the TianShu Mesh, which is based on a mapping method and developed using the Delaunay approach. The generator consists of several modules, including model processing, edge mesh generation, surface mesh generation, volume mesh generation, mesh quality optimization, and mesh file import/export. Moreover, it offers certain innovations and advantages in adaptive mesh generation and efficient point insertion algorithms. The proposed mesh generator enables high-quality adaptive tetrahedral mesh generation for complex electromagnetic models, providing strong support for model discretization in electromagnetic simulation.

Bio: Junhui Yin was born in Hunan, China, in 1989. He received his Ph.D. degree in Electronic Science and Technology from the University of Electronic Science and Technology of China (UESTC), Chengdu, China, in 2020. In July 2020, he joined the School of Electronic Science and Engineering at UESTC, where he has been an Associate Researcher since May 2022. His research interests include mesh generation, scene reconstruction, and numerical methods.

Over the past five years, he has served as principal investigator or coprincipal investigator on seven national-level research projects, including those funded by the National Natural Science Foundation of China, as well as subprojects of major national initiatives on large-scale industrial software, subprojects of national science and technology major projects, and subprojects of national key R&D program of china. He has published over 40 academic papers, filed more than 20 national invention patents, and obtained 13 software copyrights. He was awarded the First Prize of the Sichuan Provincial Technological Invention Award in 2025.

Invited Speaker VII

17:05-17:25, June 25, 2026, Thursday -- GMT+8, Beijing Time

Meeting Room: 香樟厅, 1st Floor



Dr. Haoqiang Feng

Zhejiang University, China

Speech Title: High-Order Discontinuous Galerkin Method for 3D IC Thermal Simulation with Interfacial Thermal Resistance

Abstract: As the integration density of 3D integrated circuits (3D ICs) continues to increase, thermal management has become a key challenge for system reliability. Accurate thermal modeling in these multi-scale architectures is complicated by interfacial thermal resistance, which induces sharp temperature discontinuities across material interfaces. Conventional numerical methods typically require additional degrees of freedom to resolve such discontinuities. This talk presents a 3D thermal simulation framework based on a high-order discontinuous Galerkin method. By directly incorporating interfacial thermal resistance into the numerical flux, the proposed method achieves high-order convergence and stability without increasing the number of global unknowns. We first verify the convergence behavior of the proposed method and subsequently demonstrate its application to the thermal analysis of GaN power amplifiers. The proposed framework serves as a high-fidelity thermal analysis module within a unified DG-based multi-physics EDA framework.

Bio: Haoqiang Feng was born in Hangzhou, China, in 1997. He received the B.E. degree in information engineering from Zhejiang University, Hangzhou, China, in 2019, and the Ph.D. degree in electronic science and technology from Zhejiang University, Hangzhou, China, in 2025. Currently, he serves as a Qishi Postdoctoral Research Fellow with the Department of Information Science and Electronic Engineering, Zhejiang University, Hangzhou, China. His research interests include advanced numerical methods, multiphysics modeling, and high-performance computing.

Invited Speaker VIII

17:30-17:50, June 25, 2026, Thursday-- GMT+8, Beijing Time

Meeting Room: 国槐厅, 1st Floor



Dr. Yanwei Wang

Chengdu Aerospace Bomu Electronic Technology Co., Ltd.

Speech Title: Specification-to-Schematic Automation Zero-Touch Methodology for GaAs Low Noise Amplifier ICs

Abstract: With the escalating complexity of integrated circuit design, minimizing human intervention to achieve automated circuit design has become a focal point in the industry. This talk presents a fully automated design methodology tailored for Gallium Arsenide (GaAs) Low-Noise Amplifiers (LNAs), aiming to realize "zero-touch" generation directly from design specifications to circuit schematics.

The presentation will detail how the proposed framework autonomously constructs the mapping space from specifications to circuit diagrams. We will delve into a novel multi-dimensional constraint-solving algorithm capable of achieving: autonomous selection of transistors and biasing; automatic identification of the optimal noise impedance point; automated matching network design based on the Q-factor constraint method; and the seamless conversion from ideal components to PDK-based devices. Furthermore, experimental results will be demonstrated to validate the framework's capability to navigate the complete design flow without human intervention, flexibly balancing both broadband and narrowband performance.

Bio: Dr. Yanwei Wang received his Ph.D. from Southeast University and currently serves as a Project Lead at Chengdu Aerospace Bomu Electronic Technology Co., Ltd. Specializing in microwave/RF IC design, his research focuses on the automation of filters, LNAs, and PAs. Dr. Wang has pioneered a "zero-touch" automated design framework that transforms specifications into schematics using structured PDK parsing and constraint-solving algorithms, significantly improving design efficiency for complex chips. He holds over 10 authorized national invention patents in the field of microwave chip automation.

Invited Speaker IX

17:00-17:20, June 25, 2026, Thursday--GMT+8, Beijing Time

Meeting Room: 梧桐厅, 1st Floor



Assoc. Prof. Guoxiang Shu

Shenzhen University, China

Speech Title: Study of Integrated Terahertz Traveling Wave Tube Amplifiers

Abstract: Compared with conventional fundamental-mode single-beam traveling-wave tube (TWT) amplifiers, integrated multi-beam traveling-wave tubes can multiply output power by increasing electron beam current, so as to improve core performances such as detection range and anti-interference capability of terahertz application systems, including high-precision radar and high-speed communication. Nevertheless, the development of such novel devices is currently restricted by a series of critical scientific and technical challenges, including high-quality generation and long-distance stable transmission of multiple electron beams, mode regulation of multi-beam slow-wave structures, and stable beam-wave interaction. Focusing on the aforementioned challenges, Shenzhen University has carried out in-depth research covering theoretical analysis, simulation design and experimental verification on core components such as multi-beam slow-wave structures, multi-beam power couplers, multi-beam electron guns, multi-beam magnetic focusing assemblies and beam-wave interaction systems in recent years. This presentation summarizes the recent research progress of Shenzhen University on integrated terahertz traveling-wave tube amplifiers.

Bio: Dr. Shu Guoxiang, Research Fellow and Doctoral Supervisor at Shenzhen University, Recipient of the Guangdong Outstanding Youth Fund, Shenzhen Overseas High-Level Talent, and Nanshan District Pioneer Talent. He is a permanent member of the State Key Laboratory of Radio Frequency Heterogeneous Integration and a core member of the Shenzhen Peacock Program Team. He also serves as a Committee Member of the Microwave Technology Committee of the China Institute of Communications, IEEE Senior Member, and Senior Member of the Chinese Institute of Electronics. His long-term research focuses on high-power millimeter-wave and terahertz vacuum electronic devices. He has presided over 16 research projects, including 5 national-level ones such as special topics of the National Key R&D Program, General/Youth Programs of the National Natural Science Foundation of China, the JKW 173 Program, and ZF pre-research projects, with total research funding exceeding 10 million RMB. He has published nearly 80 SCI journal papers in total, among which 40 were published as the first or corresponding author in journals including IEEE T-MTT, T-TST, EDL, TED and APL (34 papers in IEEE Transactions and EDL). He has received numerous honors, including the Third Prize of the Science and Technology Innovation Award from the China Industry-University-Research Cooperation Promotion Association (2025), the First Prize of Guangdong Excellent Teaching Achievement Award for

Postgraduate Education, and Outstanding Master's Thesis Supervisor awarded by the Chinese Institute of Electronics.

Invited Speaker X

17:20-17:40, June 25, 2026, Thursday--GMT+8, Beijing Time

Meeting Room: 梧桐厅, 1st Floor



Engineer Wenyu Li

The Twelfth Research Institute of China Electronics Technology Group Corporation (CETC-12), China

Speech Title: Design Research and Experimental Verification of a Ka-Band Broadband, High Transmission Pulse Traveling Wave Tube

Abstract: Ka-band Traveling Wave Tubes (TWTs) have become one of the key developing devices in the microwave and RF field due to their ability to achieve high-power, high-gain output over broad bandwidths and their compact structure. This paper focuses on the design of a Ka-band broadband, high transmission pulse TWT. Through the optimized design of the high-frequency slow-wave structure employing Dual-Velocity Taper (DVT) technology and broadband phase velocity equalization techniques, a pulse TWT with an output power exceeding 500 W, an operating bandwidth of 3 GHz, and an overall efficiency reaching 47% was achieved. Through detailed design and optimization of the periodic permanent magnet (PPM) focusing system, including careful magnetic field matching in the transition region, a high transmission rate of 99.3% was realized. The depressed collector was designed with multi-stage energy recovery to maximize overall efficiency. Comprehensive experimental verification confirmed that the prototype meets all design specifications, demonstrating excellent agreement between simulation and measurement results. The high transmission rate significantly reduces losses in the slow-wave structure, improves product reliability, and enhances adaptability to environmental changes.

Bio: Wenyu Li received her bachelor's degree in Communication Engineering from Beijing Institute of Technology in 2020 and her master's degree in Electronic Information from State Key Laboratory of Media Convergence and Communication, Communication University of China in 2023. She currently serves as an engineer at the Twelfth Research Institute of China Electronics Technology Group Corporation (CETC-12), focusing primarily on the design and development of high-power space traveling wave tubes. She has published papers in prestigious microwave journals and conferences such as TAP, TMTT, and APS, with research interests including metamaterial absorbers and low radar cross section antennas, TWT design.

Day 1- June 24, 2026

Wednesday, GMT+8, Beijing Time

Onsite Sign-in

Time	Event	Venue
10:00-17:00	Onsite Sign-in	Hotel Lobby

Day 2- June 25, 2026

Thursday, GMT+8, Beijing Time

2026 年全国射频微波技术与产业发展大会

Onsite Meeting Room: 璀璨厅, 2nd Floor

09:00-09:40	开幕与战略发布 Opening Ceremony & Strategy Launch	璀璨厅, 2nd Floor
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EEMS 2026 Schedule

Onsite Meeting Room: 国槐梧桐厅, 1st Floor

09:50-09:55	Welcome Message Prof. Kama Huang, Sichuan University, China	国槐梧桐厅, 1st Floor
09:55-10:00	Opening Remarks Prof. Yikai Chen, University of Electronic Science and Technology of China, China	
10:00-10:40	<i>Speech Title: Electromagnetic Selective Structures: Concept and Design</i> Prof. Zhongxiang Shen, Yangtze Delta Region Academy of Beijing Institute of Technology, Jiaxing, China IEEE Fellow	

10:40-11:10	Group Photo & Coffee Break	
11:10-11:50 Keynote Speech II	<p><i>Speech Title: Multi-objective microwave wireless power transfer - the energy cornerstone of 6G-enabled intelligent everything</i></p> <p>Prof. Jiancao Hou, Sichuan University, China</p>	国槐梧桐厅, 1st Floor
11:50-13:30	Lunch (池畔餐厅, B1)	
13:30-14:10 Keynote Speech III	<p><i>Speech Title: Beam Control in High-Efficiency Compact Planar Antennas</i></p> <p>Prof. Mei Li, Chongqing University, China</p>	国槐梧桐厅, 1st Floor
14:10-14:50 Keynote Speech IV	<p><i>Speech Title: Theory and Practice of Near-Field Millimeter-Wave Imaging for Human Security Screening</i></p> <p>Assoc. Prof. Chuan Lin, Southwest Jiaotong University, China</p>	国槐梧桐厅, 1st Floor

Onsite Sessions

15:20-16:55	<p>Oral Session 1: Numerical Computation of Electromagnetic Fields and Multi-Scale Modeling Methods</p> <p>Session Chair: Associate Research Fellow Junhui Yin, University of Electronic Science and Technology of China, China</p> <p>Invited Speaker: Associate Research Fellow Junhui Yin</p> <p>SC064, SC004, SC062, SC036-A, SC082-A</p>	国槐厅 1st Floor
15:20-16:45	<p>Oral Session 2: Electromagnetic Measurement Techniques and Characterization of Electromagnetic Material Properties</p> <p>Session Chair: Associate Research Fellow Yunpeng Zhang, University of Electronic Science and Technology of China, China</p> <p>Invited Speaker: Associate Research Fellow Gao Chong Invited Speaker: Associate Research Fellow Yunpeng Zhang</p>	梧桐厅 1st Floor

	SC043, SC071-A, SC066	
15:10-16:30	<p>Oral Session 3: Microwave Heating Mechanisms and Plasma Technology Session Chair: Prof. Zhengming Tang, China West Normal University, China</p> <p>Invited Speaker: Prof. Zhengming Tang</p> <p>SC018-A, SC024-A, SC070, SC083-A</p>	香樟厅 1st Floor
16:30-17:10	Coffee Break	
17:10-18:35	<p>Oral Session 4: Design Technologies for Microwave Passive Devices and Antenna Arrays Session Chair: Prof. Georg Wimmer, Shenzhen Technology University, China</p> <p>Invited Speaker: Prof. Kwok L. Chung Invited Speaker: Dr. Yanwei Wang</p> <p>SC002, SC017, SC027</p>	国槐厅 1st Floor
17:00-18:25	<p>Oral Session 5: Design and Application of Vacuum Electronic Devices in the Terahertz Frequency Range Session Chair: Assoc. Prof. Guoxiang Shu, Shenzhen University, China</p> <p>Invited Speaker: Assoc. Prof. Guoxiang Shu Invited Speaker: Engineer Wenyu Li</p> <p>SC008, SC061, SC059</p>	梧桐厅 1st Floor
16:45-18:10	<p>Oral Session 6: Wireless Communication Systems and Intelligent Network Resource Optimization Technologies Session Chair: Assoc. Prof. Yi Chen Zhong, Xidian University, China</p> <p>Invited Speaker: Assoc. Prof. Yi Chen Zhong Invited Speaker: Dr. Haoqiang Feng</p> <p>SC048, SC047, SC049</p>	香樟厅 1st Floor
18:40-20:00	Dinner	

Day 3 - June 26, 2026

Friday, GMT+8, Beijing Time

Onsite Sessions

09:00-10:24	<p><i>Poster Session 7: Electromagnetic Field Theory and Microwave Scattering Parameter Measurement Methods</i> Session Chair: Assoc. Prof. Yi Zhang, Sichuan University, China</p> <p>SC015, SC006, SC030, SC068, SC028, SC067, SC016, SC038, SC019, SC012, SC026, SC013, SC021, SC005</p>	<p>香樟厅 1st Floor</p>
10:24-10:34	<p>Coffee Break</p>	
10:34-11:58	<p><i>Poster Session 8: Design Methods for High-Power Microwave Devices and Systems</i> Session Chair: Assoc. Prof. Yi Zhang, Sichuan University, China</p> <p>SC034, SC054, SC053, SC063, SC014, SC009, SC010, SC060, SC051, SC080, SC035, SC081, SC040, SC020</p>	<p>香樟厅 1st Floor</p>
12:10-13:30	<p>Lunch (颐都府中餐厅-思佳客, F2)</p>	

Oral Session 1: Numerical Computation of Electromagnetic Fields and Multi-Scale Modeling Methods

Session Time Period: 15:20-16:55 (GMT+8, Beijing Time), Thursday, June 25, 2026

Conference Room: 国槐厅, 1st Floor

Session Chair: Associate Research Fellow Junhui Yin, University of Electronic Science and Technology of China, China

Invited Speech

15:20-15:40

Title: Unstructured Mesh Generation Techniques for Computational Electromagnetics

Invited Speaker: Associate Research Fellow Junhui Yin, University of Electronic Science and Technology of China, China

Abstract: In the design of electronic products, electromagnetic simulation plays a crucial role. Mesh generation is a key step in electromagnetic simulation, and the quality of the mesh directly determines the accuracy, efficiency, and even the success of subsequent computations. In recent years, as electromagnetic targets and environments have become increasingly complex, the requirements for model processing have continued to grow. However, mesh generation in electromagnetic simulation still largely relies on general-purpose commercial software, which makes local refinement and integrated optimization inconvenient. This report introduces an unstructured mesh generator for electromagnetic industrial software, namely the TianShu Mesh, which is based on a mapping method and developed using the Delaunay approach. The generator consists of several modules, including model processing, edge mesh generation, surface mesh generation, volume mesh generation, mesh quality optimization, and mesh file import/export. Moreover, it offers certain innovations and advantages in adaptive mesh generation and efficient point insertion algorithms. The proposed mesh generator enables high-quality adaptive tetrahedral mesh generation for complex electromagnetic models, providing strong support for model discretization in electromagnetic simulation.

SC064

15:40-15:55

Title: Study on Electromagnetic Scattering from Breaking Waves and Foam under High Sea States

Authors: Xue Zhen, Yanmin Zhang, Yunhua Wang, Pengbo Du

Presenter: Xue Zhen, Ocean University of China, China

Abstract: Under high sea states, wave breaking can significantly change the electromagnetic scattering characteristics of the sea surface. To better investigate the contributions of breaking waves and foam to electromagnetic scattering, this study first develops a parameterized model based on deep learning to describe how breaking waves and foam coverages vary with wind speed. The parameterized models are then used as weighting factors for different

components in the electromagnetic scattering model under high sea states. On this basis, the small-slope approximation is used to calculate the backscattering coefficient of the free sea surface. The effects of foam and breaking waves on the normalized radar cross section (NRCS) of the sea surface are then analyzed using the vector radiative transfer equation (VRT), the non-polarized breaking-wave model, and the small-slope approximation method for the free sea surface, respectively. The experimental results show that breaking waves generally increases the backscattering coefficient of the sea surface. Foam mainly affects the HH-polarized backscattering coefficient at large incidence angles, and its effect on the sea surface NRCS is stronger when the observation is made in the crosswind direction. In addition, foam also has a greater effect on the scattering coefficient of high-frequency electromagnetic waves. And the theoretical simulation is validated by measured data, which demonstrates the rationality and reliability of the simulation results.

SC004

15:55-16:10

Title: Two-Dimensional Numerical Simulation of Gyromagnetic Nonlinear Transmission Lines

Authors: Yuqi He, Xiaoyun Zhao, Hongxiang Zhai, Ji Cai, Biao Hu, Danni Zhu
Presenter: Yuqi He, Chengdu University of Technology, China

Abstract: The gyromagnetic nonlinear transmission line (GNLTL) is a novel high-power microwave (HPM) source that has advanced rapidly due to its compact size, low cost, simple structure, and flexible frequency tunability. However, its strong nonlinearity and unique physics challenge conventional simulation methods. This paper presents a two-dimensional numerical approach based on the finite-difference time-domain (FDTD) method in cylindrical coordinates, coupled with MATLAB's ode15s solver to handle the stiff, nonlinear magnetization dynamics. The method ensures stability and efficiency, offering a reliable tool for the design and performance prediction of GNLTLs.

SC062

16:10-16:25

Title: Simulation of High Voltage Insulators with Thin Material Surfaces using Higher Order Finite Elements

Authors: Georg Wimmer, Peigang Han, Zhizhong Wang, Huayue Chen
Presenter: Georg Wimmer, Shenzhen Technology University, China

Abstract: The numerical simulation of a high voltage insulator having a thin material surface is presented. If the material is modelled as a thin volume layer the standard finite element method results in a unnecessary large linear system of equations. It is shown that the matrix size and the condition number can be significantly reduced by introducing finite elements of reduced space dimension for the thin material surface. An axisymmetric geometry of a high voltage insulator is used to demonstrate the method. This allows to solve the problem in the 2D plane. Higher order nodal Lagrange interpolatory shape functions are used for the discretization of the weak formulation on a triangular mesh.

SC036-A

16:25-16:40

Title: DDM-Based Hybrid PE-EPA Method for Wave Propagation Prediction in Complex Environments with Large-inclination Obstacles

Authors: Anqi Li

Presenter: Anqi Li, Army Engineering University of PLA, China

Abstract: To address the challenge of predicting wave propagation in complex obstacle environments, especially when the obstacles are inclined, a novel method integrates the two-way parabolic equation (2W-PE) with the equivalence principle algorithm (EPA) to compute the spatial field. First, the computational domain is divided into obstacle and obstacle-free regions. In obstacle-free regions, the 2W-PE is solved stepwise to obtain the spatial field, whereas in obstacle regions, equivalent surfaces are introduced via the EPA. The scattering of the equivalent electromagnetic currents (EEMCs) on these surfaces is used to replace the scattering effect of the internal obstacles. Recognizing the computational complexity of directly calculating the output EEMCs, we introduce a U-Net to significantly improve the calculation efficiency. Furthermore, scattering screens are designed to couple the two methods across different subdomains. Comparisons with the traditional 2W-PE and the method of moments (MoM) in multi-obstacle environments demonstrate that the proposed method achieves high accuracy, is nearly two orders of magnitude faster, and overcomes the inherent limitations of the conventional 2W-PE. Therefore, this method effectively resolves the long-standing trade-off between speed and accuracy in spatial field computation under complex obstacle conditions, providing critical support for real-world wireless communication applications.

SC082-A

16:40-16:55

Title: A physics-informed Learned-Homogenization model for efficient effective-permittivity modeling of random porous media

Authors: Hao Li, Kama Huang, Wenqi Chen, Penghao Dong

Presenter: Hao Li, Sichuan University, China

Abstract: Efficient effective-permittivity modeling of random porous media is essential for the design and optimization of microwave-assisted multiphase catalytic reactors containing random porous catalyst supports. However, directly resolving realistic interconnected pore structures in full-wave simulations is computationally expensive, while classical effective-medium models often show limited accuracy for interconnected porous media because of their idealized assumptions about phase distribution and pore geometry. To address this problem, this work develops a physics-informed Learned-Homogenization (L-H) model for predicting the effective complex permittivity of random porous media. Three-dimensional porous structures with controlled porosity and pore morphology were generated using the Quartet Structure Generation Set method, and their equivalent electromagnetic responses were obtained through frequency-domain full-wave resonant-cavity simulations. A Bayesian-regularized neural network was used to retrieve effective complex permittivity from

multidimensional S-parameters, and symbolic regression was then applied to derive explicit analytical expressions relating porosity, skeleton permittivity, and geometric specific surface area to the effective response. The resulting L-H model preserves key physical limits and provides interpretable constitutive relations with explicit mathematical forms. On the simulation-generated symbolic-regression dataset, the learned expressions achieved coefficients of determination of 0.9989 and 0.9987 for the real and imaginary parts of effective permittivity, respectively. Resonant-cavity measurements on SiC foams further showed that the proposed model yielded smaller S-parameter deviations than representative classical mixing models. These results indicate that the physics-informed L-H model can convert pore-resolved electromagnetic simulation data into compact effective-property expressions, enabling efficient reactor-scale electromagnetic and multiphysics simulations without explicitly resolving random pore geometries.

Oral Session 2: Electromagnetic Measurement Techniques and Characterization of Electromagnetic Material Properties

Session Time Period: 15:20-16:45 (GMT+8, Beijing Time), Thursday, June 25, 2026

Conference Room: 梧桐厅, 1st Floor

Session Chair: Associate Research Fellow Yunpeng Zhang, University of Electronic Science and Technology of China, China

Invited Speech

15:20-15:40

Title: High sensitivity test of dielectric properties of electromagnetic functional fibers

Invited Speaker: Associate Research Fellow Chong Gao, University of Electronic Science and Technology of China, China

Abstract: Functional composite materials and devices made from fibers, such as those with wave-transparent, stealth and shielding properties, are widely used in various key fields, such as radomes, wearable devices and PCB substrates. As a key raw material for composite materials and devices, the dielectric properties of electromagnetically functional fibers directly influence the overall performance. In previous research, direct testing of the dielectric properties of individual fibers or fiber bundles has been rare, primarily due to the high sensitivity requirements that conventional test setups struggle to meet. To address this issue, a semi-cylindrical cavity incorporating a metal ridge structure has been proposed. This design offers excellent testing sensitivity even for individual fiber filaments, whilst also delivering highly effective results for testing the dielectric properties of fiber bundles. This testing method and structure are of significant importance for the control and inspection of the electrical properties of electromagnetic functional fiber materials.

Invited Speech

15:40-16:00

Title: Test Method of Electromagnetic Shielding Effectiveness of Transparent Conductive Films Based on Coaxial Resonant Cavity

Invited Speaker: Associate Research Fellow Yunpeng Zhang, University of Electronic Science and Technology of China, China

Abstract: With the wide application of transparent conductive films (TCFs) in the field of electromagnetic shielding, the demand for in-situ evaluation of their electromagnetic performance in the installed state has become increasingly urgent. The existing method is only applicable to the uninstalled state and cannot meet the in-situ testing requirements of the installed TCF. To address this limitation, a single-sided in-situ testing sensor based on a coaxial resonant cavity is proposed. It can measure the microwave surface resistivity of the TCF and further derive the electromagnetic shielding effectiveness (SE). The sensor operates in S and C bands. Test results for ITO films indicate that the SE test range of the sensor covers 25-55 dB, and the test accuracy is better than ± 2 dB.

SC043

16:00-16:15

Title: Multi-VNA Benchmarking for Antenna Input Impedance Measurement: Experimental Insights and Uncertainty Assessment

Authors: Liwen Liang, Kwok L. Chung, Canxing Cai, Shiquan Wang

Presenter: Liwen Liang, Guangzhou Institute of Science and Technology, China

Abstract: Vector Network Analyzers (VNAs) are essential high-precision instruments in radio frequency engineering, serving a critical role in characterizing antenna input impedance (Z_{in})—a fundamental parameter for evaluating impedance matching, reflection coefficient, and far-field performance. This study presents a comparative measurement analysis of three commercial VNAs (ANRITSU MS46322B, Keysight E5063A, and Rohde & Schwarz ZNL20) using two patch antennas under standardized SOL calibration conditions. Measurement deviations are quantified using the root-mean-square error (RMSE) method. The results reveal systematic discrepancies among the instruments, with the imaginary component of impedance exhibiting significantly larger deviations than the real component. Furthermore, each VNA demonstrates distinct performance characteristics across different test scenarios. These findings provide practical experimental guidance for VNA selection and measurement uncertainty assessment in RF antenna characterization.

SC071-A

16:15-16:30

Title: A Passive Magnetolectric Resonant Transducer for Low-Power Electromagnetic Near-Field Monitoring

Authors: Haoqi Lyu, Tao Wu, Xudong Zou

Presenter: Haoqi Lyu, Chinese Academy of Sciences, China

Abstract: This work demonstrates an ultrathin, silicon-free magnetolectric resonant transducer for passive electromagnetic near-field monitoring. The device is based on a 150-nm AlScN / 100-nm FeGaB bilayer and converts an incident AC magnetic field directly into resonant mechanical vibration through magnetostrictive stress, followed by piezoelectric electrical readout. Different from actively driven magnetolectric resonators, inductive pickup probes, or frequency-tracking magnetic sensors, the proposed device operates without local electrical drive during magnetic-field sensing. A complete and traceable calibration chain from incident magnetic field to mechanical displacement and electrical output is established, enabling quantitative evaluation of passive miniature magnetic-field probes for electromagnetics system monitoring.

SC066

16:30-16:45

Title: Impact of Layout Geometry on Propagation Constants and Measurement Accuracy: Standalone vs Merged CPW/GCPW for Dielectric Characterization

Authors: Jialiang Ni, Kwok L. Chung, Liwen Liang, Tao Ye

Presenter: Jialiang Ni, Guangzhou Institute of Science and Technology, China

Abstract: This paper compares three coplanar-waveguide (CPW) configurations for dielectric characterization on RO4003C substrate across 0.5–20 GHz:

separated long, separated short, and merged transmission lines. The critical difference lies in material under-test (MUT) loading—separated lines use distinct MUT samples, introducing batch variation, whereas the merged layout employs a single shared MUT to eliminate material inconsistency. Through CST electromagnetic simulation, propagation constants ($\gamma = \alpha + j\beta$) are extracted from S-parameters to derive dielectric properties indirectly. Using FR4 as the reference MUT, results

indicate that separated configurations exhibit lower attenuation (α), phase constant (β), insertion loss, and a marginally lower dielectric constant. Conversely, the merged approach enhances measurement consistency and reliability via unified MUT loading. These findings elucidate configuration-dependent effects on

characterization accuracy, informing the design of high-precision CPW-based dielectric measurement systems.

Oral Session 3: Microwave Heating Mechanisms and Plasma Technology

Session Time Period: 15:10-16:30 (GMT+8, Beijing Time), Thursday, June 25, 2026

Conference Room: 香樟厅, 1st Floor

Session Chair: Prof. Zhengming Tang, China West Normal University, China

Invited Speech

15:10-15:30

Title: Key Technologies and Applications of Microwave Efficient Heating and Precise Control

Invited Speaker: Prof. Zhengming Tang, China West Normal University, China

Abstract: This paper presents a systematic framework to optimize industrial microwave heating through advancements in energy generation, low-loss transmission, and intelligent frequency control. To address the low efficiency of traditional magnetrons, a six-element composite cathode is developed, increasing the microwave conversion efficiency to 69.1%. In the transmission stage, two core integrated structures—the coaxial circular waveguide and the side-connected circular waveguide—are innovatively designed to fundamentally minimize energy loss and prevent dielectric breakdown. Furthermore, an optimized frequency selection mechanism ensures sustained energy coupling under dynamic load conditions. Experimental results demonstrate that the proposed method achieves a microwave absorption rate of 95.21%, compared to 35.19% for conventional static fixed-frequency methods. In industrial applications involving fluorine rubber dehydration, the drying cycle is substantially shortened while completely suppressing localized thermal runaway, with the final moisture content successfully reduced to trace levels. These findings confirm the viability of the optimized architecture for high-performance and energy-intensive industrial processing.

SC018-A

15:30-15:45

Title: An Auto-Tuned Frequency Tracking Approach to Resonant Microwave Heating for Low-Loss Shales

Authors: Chuang Zhang, Daming Gou, Chaoxia Zhao, Yi Zhang, Kama Huang

Presenter: Chuang Zhang, Sichuan University, China

Abstract: Microwave heating has attracted sustained interest for rapid thermal processing due to its potential for selective volumetric energy deposition and high conversion efficiency. Despite these advantages, low-loss dielectric materials are often difficult to heat effectively because electromagnetic coupling is weak and, in resonant systems, the operating point can drift as temperature-dependent material properties and boundary conditions evolve. This drift causes resonance detuning, elevated reflected power, and unstable field enhancement, ultimately limiting heating rate and energy efficiency.

To overcome these limitations, this study proposes an adaptive resonant

microwave heating framework that combines (i) a high-Q single-mode resonant cavity for strong electric-field concentration and (ii) a closed-loop resonance frequency tracking algorithm that automatically retunes the excitation frequency in real time. The tracking strategy estimates resonance changes during operation and continuously adjusts the source frequency to maintain near-optimal coupling, thereby stabilizing power delivery and preserving the benefits of single-mode resonance without manual intervention.

The approach is evaluated through comparative experiments under multiple representative heating modes, including fixed-frequency excitation and non-resonant (multimode) microwave heating. Results consistently indicate that real-time frequency tracking in a single-mode resonant configuration reduces reflected power and improves heating effectiveness relative to non-tracking baselines, particularly under conditions where resonance drift is pronounced. Overall, the proposed method provides a practical route toward robust, energy-efficient microwave thermal processing of low-loss dielectrics, and offers a generalizable control paradigm for resonant microwave systems operating under dynamically changing loads.

Title: Microwave atmospheric pressure plasma jet generated from Air-filled substrate integrated waveguide resonator

Authors: Ruiming Lu, Chaoxia Zhao, Yi Zhang

Presenter: Ruiming Lu, Xihua University, China

Abstract: Microwave plasma atmospheric pressure plasma jet (MW-APPJ) has attracted much attention due to its advantages such as high electron density, high reactive species density, low breakdown power, and long lifetime. The abundant reactive species from MW-APPJ lead to fast and efficient chemical/biological processes, such as surface modification, material synthesis, exhaust gas or wastewater treatment, and sterilization.[1]

SC024-A

15:45-16:00

Recently, various microwave structures—mainly resonant cavity and waveguide types—have been developed for atmospheric pressure MW-APPJs. However, existing designs face several issues: In coaxial-type generators, the inner conductor is eroded by the plasma, releasing metal contaminants that interfere with applications like spectral analysis and material processing[2]. High power is often required to excite or sustain the discharge, causing significant heat loss and necessitating external cooling to avoid damage. Additionally, impedance mismatch during waveguide-to-coaxial mode conversion leads to power losses.

We propose a novel MW-APPJ generator structure that hollows out the center of the dielectric substrate in a substrate-integrated waveguide (SIW) resonator and fills it with air. By hollowing out the center of the dielectric substrate, the effective permittivity inside the SIW resonator is reduced, leading to lower losses and improved energy efficiency. Using the finite element method (FEM), numerical simulations of the proposed structure are carried out, while

experimental verification is also performed by measuring the reflection coefficient and comparing it with the simulation results. Furthermore, in this work, the electron density and electron temperature of the microwave plasma jet generated by the air-filled SIW structure are measured under different flow rates and power levels, and compared with those of other types of exciters. These results provide optimization strategies for the future design of microwave plasma exciters with high energy efficiency.

Title: Low-Reflection Design of a Compact Broadband Irradiation System for Dual-Frequency Plant Microwave Exposure

Authors: Zhihao Huang, Hong Fu, Hai Zhao, Fangyuan Chen, Xiaowen Xu, Mingli Liao, Zhengming Tang

Presenter: Zhihao Huang, China West Normal University, China

SC070

16:00-16:15

Abstract: Conventional plant microwave irradiation systems often suffer from excessive bulk, severe low-frequency reflections, and limited broadband compatibility. To address these challenges, this paper proposes a synergistic co-design methodology that integrates a compact broadband anechoic chamber with a dedicated Vivaldi probe antenna. A 100 cm × 100 cm × 100 cm shielded chamber operating over 0.6–6 GHz is developed, adopting a zoned radar-absorbing material (RAM) deployment strategy, with full absorption on the top and bottom walls and patterned local absorption on the side walls, as well as an externally mounted feed configuration to reduce additional scattering and near-field perturbation inside the chamber. In parallel, a double-slot Vivaldi antenna integrated with a circular metallic confinement structure is designed to enhance low-frequency radiation confinement and improve the spatial stability of the electric field. Full-wave electromagnetic simulations show that the proposed probe antenna maintains $|S_{11}| < -10$ dB over the target band, with electric-field variation coefficients of 8.6% at 945 MHz and 11% at 2.45 GHz in the 50 cm × 50 cm × 30 cm central irradiation region. This work provides a reproducible technical framework for next-generation miniaturized plant microwave irradiation platforms.

SC083-A

16:15-16:30

Title: Effect of Electric Field Direction on Liquid Materials Evaporation under Microwave Heating

Authors: Song Jia, Kama Huang, Song Wang, Haoyu Wang

Presenter: Song Jia, Sichuan University, China

Abstract: Microwave energy, as a clean and efficient energy source, has been widely applied in daily life and industrial production. Improving heating and drying efficiency has always been an important research topic in microwave heating and drying technologies. Previous studies have analyzed and verified that the electric field direction at the liquid surface leads to different evaporation energy consumption during microwave heating of water. To verify this

phenomenon and spread it furthermore, we used 8 kinds of organic solvents as the research material, including polar solution and weakly-polar solution. this research combines Gromacs simulation, COMSOL simulation and experiment to further validate the above conclusion. Especially, the results were also conducted on weakly-polar solutions. The results demonstrate that the there is “electric field induced effect ” in microwave heating, which means electric field direction at the liquid surface have a significant effect on liquid evaporation, and the electric field perpendicular to the liquid surface facilitates the evaporation process more effectively. The difference of evaporation energy consumption could be from 9% to 23%.

Oral Session 4: Design Technologies for Microwave Passive Devices and Antenna Arrays

Session Time Period: 17:10-18:35 (GMT+8, Beijing Time), Thursday, June 25, 2026

Conference Room: 国槐厅, 1st Floor

Session Chair: Prof. Georg Wimmer, Shenzhen Technology University, China

Invited Speech

17:10-17:30

Title: Advanced Materials for Flexible Antennas and Sensors: A Focus on Conformal Dielectrics and a Strain Sensor Implementation

Invited Speaker: Prof. Kwok L. Chung, Guangzhou Institute of Science and Technology, China

Abstract: With the rapid development of flexible electronic technologies, flexible antennas and sensors are moving toward lightweight, conformal design and multifunctional integration. Flexible conductive and dielectric materials have achieved remarkable breakthroughs and diversified development in fundamental research and applications. This paper reviews recent advances in materials for flexible antennas and sensors, analyzes key challenges in preparation, performance optimization, and device integration, and presents a practical implementation of a dual-axis antenna-based strain sensor using RT/duroid 5880. It aims to provide theoretical guidance and strategic insights for flexible electromagnetics research and engineering applications.

Invited Speech

17:30-17:50

Title: Specification-to-Schematic Automation Zero-Touch Methodology for GaAs Low Noise Amplifier Ics

Invited Speaker: Yanwei Wang, Chengdu Aerospace Bomu Electronic Technology Co., Ltd., China

Abstract: This paper proposes a fully automated design methodology for low-noise amplifier (LNA) integrated circuits, achieving zero-touch generation from design specifications to schematic diagrams. The methodology employs a structured process design kit (PDK) parsing module to autonomously acquire the gate width/gate finger parameter space of transistors, coupled with a multi-dimensional constraint-solving algorithm that simultaneously optimizes device biasing points and noise matching conditions. Experimental results demonstrate that the framework autonomously spans the complete design flow without human intervention, achieving simultaneous broadband/narrowband performance through self-adaptive optimization loops.

SC002

17:50-18:05

Title: Low-Complexity Phase Retrieval Using Spectral Geometry by Finite Magnitude-Only Measurements for Phased-Array Diagnosis
 Authors: Yutong Tian, Haining Yang, Na Li, Qiao Liu
 Presenter: Yutong Tian, University of Electronic Science and Technology of China, China

Abstract: In this paper, a low-complexity phase retrieval framework based on spectral geometry is proposed for phasedarray diagnosis, aiming to reconstruct array excitations from magnitude-only measurements and enable reliable fault identification by comparison with nominal excitations. By introducing auxiliary phase variables, the original nonconvex magnitudeonly problem is reformulated into a structured optimization model with explicit geometric interpretation. A non-iterative spectral geometrybased initialization is first developed to obtain a consistent estimate of both the excitation vector and the associated phase variables. Subsequently, an efficient alternating update scheme is employed, where the excitation and phase variables admit closed-form solutions. The proposed approach avoids lifting techniques and gradient-based optimization, leading to reduced computational complexity and improved numerical stability. Simulation results comparing with 5 baseline methods demonstrate that the accuracy of the reconstructed excitations improves for maximally 9 times, and the time cost decreases for maximally 10^3 times under various fault and interference conditions, enabling accurate phased-array diagnosis from magnitudeonly measurements.

SC017

18:05-18:20

Title: Design of a Compact 10-90 MHz Fan-Conical Antenna with Fixed Matching Network and Low Elevation Radiation
 Authors: Chuankang Bai, Cheng Chang, Ting Su, Yongqin Yang
 Presenter: Chuankang Bai, Hainan University, China

Abstract: A compact 10-90 MHz ridge-loaded fan-conical antenna with an 11.0 m \times 5.1 m footprint is studied for HF and lower-VHF applications where full-size broadband radiators are difficult to deploy. A fixed external matching network enables practical 50- Ω operation over lossy ground. The source-side VSWR stays below 3 across 10-90 MHz and below 2.5 over most of the band. Relative to the uncompensated radiator, the full network improves average source-to-antenna power transfer by 2.73 dB, with a 1.07-dB average penalty relative to ideal lossless delivery. The matched-system efficiency of the full passive design stays between 76.6% and 93.3%, with an 84.5% average. Matched radiation results show a clear beam evolution: peak realized gain rises from 3.29 dBi at 10 MHz to 15.91 dBi near 67 MHz and remains 15.30 dBi at 90 MHz, while the peak elevation angle decreases from 70° to 6.5°. These results support the proposed compact structure and fixed matching strategy as a practical

compromise among size reduction, broadband 50- Ω operation, and dual-mode radiation behavior.

Title: A Wideband 1-bit glass-based Schiffman Phase-Shifter at Ka-band
Authors: Wenjun Zhu, Zheyuan Yao, Xinyu Ma, Yajing Li, Qiang Chen, Yunqi Fu

Presenter: Wenjun Zhu, National University of Defense Technology, China

SC027

18:20-18:35

Abstract: This paper presents a wideband Schiffman phase shifter implemented on a glass substrate using microstrip lines for Ka-band millimeter-wave applications. The structure of the coupled transmission line is optimized by loading parallel stubs. Electromagnetic (EM) simulation results demonstrate that the proposed design provides a relatively constant 180° phase shift over the frequency band from 32.5 GHz to 42.5 GHz, with an insertion loss of less than 0.9 dB, corresponding to a relative bandwidth of 26.67% centered at 37.5 GHz. The maximum insertion loss within the operating band is 0.9 dB, and the fractional bandwidth for -10 dB return loss is approximately 24.7%. This device achieves both low insertion loss and non-dispersive constant phase shift across a wide frequency band, with the phase error maintained within a small range.

Oral Session 5: Design and Application of Vacuum Electronic Devices in the Terahertz Frequency Range

Session Time Period: 17:00-18:25 (GMT+8, Beijing Time), Thursday, June 25, 2026

Conference Room: 梧桐厅, 1st Floor

Session Chair: Assoc. Prof. Guoxiang Shu, Shenzhen University, China

Invited Speech

17:00-17:20

Title: Study of Integrated Terahertz Traveling Wave Tube Amplifiers

Invited Speaker: Assoc. Prof. Guoxiang Shu, Shenzhen University, China

Abstract: Compared with conventional fundamental-mode single-beam traveling-wave tube (TWT) amplifiers, integrated multi-beam traveling-wave tubes can multiply output power by increasing electron beam current, so as to improve core performances such as detection range and anti-interference capability of terahertz application systems, including high-precision radar and high-speed communication. Nevertheless, the development of such novel devices is currently restricted by a series of critical scientific and technical challenges, including high-quality generation and long-distance stable transmission of multiple electron beams, mode regulation of multi-beam slow-wave structures, and stable beam-wave interaction. Focusing on the aforementioned challenges, Shenzhen University has carried out in-depth research covering theoretical analysis, simulation design and experimental verification on core components such as multi-beam slow-wave structures, multi-beam power couplers, multi-beam electron guns, multi-beam magnetic focusing assemblies and beam-wave interaction systems in recent years. This presentation summarizes the recent research progress of Shenzhen University on integrated terahertz traveling-wave tube amplifiers.

Invited Speech

17:20-17:40

Title: Design Research and Experimental Verification of a Ka-Band Broadband High Transmission Pulse Traveling Wave Tube

Invited Speaker: Engineer Wenyu Li, Beijing Vacuum Electronics Research Institute, China

Abstract: Ka-band Traveling Wave Tubes (TWTs) have become one of the key developing devices in the microwave and RF field due to their ability to achieve high-power, high-gain output over broad bandwidths and their compact structure. This paper focuses on the design of a Ka-band broadband, high-transmission pulse TWT. Through the optimized design of the high-frequency slow-wave structure employing Dual-Velocity Taper (DVT) technology and broadband phase velocity equalization techniques, a pulse TWT with an output power exceeding 500 W, an operating bandwidth of 3 GHz, and an overall efficiency reaching 47% was achieved.

Through detailed design and optimization of the periodic permanent magnet (PPM) focusing system, including careful magnetic field matching in the transition region, a high transmission rate of 99.3% was realized. The depressed collector was designed with multi-stage energy recovery to maximize overall efficiency. Comprehensive experimental verification confirmed that the prototype meets all design specifications, demonstrating excellent agreement between simulation and measurement results. The high transmission rate significantly reduces losses in the slow-wave structure, improves product reliability, and enhances adaptability to environmental changes.

SC008

17:40-17:55

Title: CCL-Based Efficient Screening Method for Axisymmetric Electrode Structures

Authors: Shilong Zhu, Hengxu Peng, Yulu Hu* and Bin Li

Presenter: Shilong Zhu, University of Electronic Science and Technology of China, China

Abstract: This paper introduces three connected component labeling (CCL) algorithms designed to automatically screen axisymmetric electrode structures with non-hollow and singly-connected (simply-connected) cross-sections. The goal is to enhance the quality of training datasets for convolutional neural network (CNN) models used in electrode design. These proposed algorithms were compared against Matlab's built-in bwlabel function. All four screening results (using the three new algorithms and bwlabel) were identical. Notably, the modified two-pass scanning algorithm achieved a peak memory usage approximately 1/4 that of bwlabel. For the training data of axisymmetric electron gun electrode structures, the effectiveness increased from an initial 3.76% (random distribution) to 100% after applying the proposed algorithms. These results suggest the algorithms hold promise for application in similar scenarios.

SC061

17:55-18:10

Title: Study of a High Efficiency 80 W Q-Band Space Traveling Wave Tube

Authors: Shuli Zhao, Sihan Yin, Yi Zhang, Xiao Liang, Yuansheng Su, Jingxin Xia, Wenjie Yu

Presenter: Shuli Zhao, Beijing Vacuum Electronics Research Institute, China

Abstract: To address the growing demand for high-throughput satellite (HTS) systems, this paper presents the design, simulation, and experimental study of an 80 W continuous-wave (CW) space traveling wave tube (TWT). To improve the output power, electronic efficiency, and nonlinear performance, a dynamic phase velocity tapering (DVT) slow-wave structure is proposed to replace the conventional phase velocity jump structure. DVT uses a multi-stage gradient in the slow-wave structure's

(SWS) pitch distribution. This enables a smoother axial evolution of the phase velocity. Consequently, the DVT design sustains beam-wave synchronism across a broad frequency range, effectively promoting beam-wave energy exchange. High-precision simulations are carried out using the Microwave Tube Simulation Studio (MTSS) software. Experimental results from the prototype validate the design methodology. Across the full Q-band (37.5–42.5 GHz), performance is excellent. The Q-band space TWT delivers a minimum saturated output power of 84 W. The electronic efficiency remains above 19%, and the saturated gain exceeds 53 dB. Benefiting from the four-stage depressed collector, the total efficiency surpasses 55.8%. Notably, the small-signal gain flatness is suppressed to less than 1.3 dB, which demonstrates an excellent broadband nonlinear performance. The electron beam transmission efficiency exceeds 98%. Additionally, the device successfully passed rigorous environmental reliability tests, including random vibration, shock, and thermal cycling. The device is confirmed suitable for harsh space environments. The proposed TWT features high power, high efficiency, wide bandwidth, and high reliability, making it suitable for high-throughput satellite communication systems

SC059

18:10-18:25

Title: From 5G-Advanced to 6G: Harnessing Wireless Big Data and AI for Autonomous Network Intelligence

Authors: Tao Ye, Kwok L. Chung, Xin-Hua Zhao, Jialiang Ni

Presenter: Tao Ye, Guangzhou Institute of Science and Technology, China

Abstract: The rapid evolution toward 5G-Advanced (5G-A) introduces unprecedented network scale, heterogeneity, and operational complexity, rendering conventional manual operation and maintenance paradigms fundamentally inadequate. This paper investigates the convergence of wireless big data and artificial intelligence (AI) to enable intelligent autonomous largescale 5G-A networks. We first clarify the essential characteristics of 5G-A wireless big data and propose an end-to-end systematic architecture integrating NFV, SDN, and edge computing, encompassing core network and enhanced radio access network subsystems. The enhanced Network Data Analytics Function (NWDAF) modules and hybrid real-time/offline processing mechanisms are analyzed in detail. Furthermore, we systematically examine five core application scenarios: datadriven channel modeling, user-clustering-based transmission optimization, ML-enabled MIMO link adaptation, beam scanning optimization, and AI-driven AIOps. Quantitative evaluations demonstrate that the proposed framework significantly improves network efficiency, reduces operational costs, and enhances service quality. Finally, we identify critical remaining challenges including data privacy, algorithm robustness, cross-domain

collaboration, and energy efficiency, and outline promising future research directions toward 6G and beyond, such as integrated sensing and communication, digital twin networks, endogenous intelligence, and green AI. This work provides a comprehensive theoretical and practical foundation for the intelligent evolution of next-generation wireless networks.

Oral Session 6: Wireless Communication Systems and Intelligent Network Resource Optimization Technologies

Session Time Period: 16:45-18:10 (GMT+8, Beijing Time), Thursday, June 25, 2026

Conference Room: 香樟厅, 1st Floor

Session Chair: Assoc. Prof. Yi Chen Zhong, Xidian University, China

Invited Speech

16:45-17:05

Title: Advancements in 2-Bit Programmable Metasurface Antennas: From Polarization Insensitivity to Highly Integrated Multipolarization Beam Scanning
Invited Speaker: Assoc. Prof. Yi Chen Zhong, Xidian University, China

Abstract: Programmable metasurface antennas (PMAs) and reconfigurable intelligent surfaces (RIS) are crucial for next-generation communications, yet achieving high aperture efficiency and multi-polarization with simplified structures remains challenging. This academic talk presents two recent advancements in 2-bit PMAs. First, we introduce an S-band programmable reflectarray antenna (PRA) that minimizes p-i-n diodes and utilizes a slotted polygon patch to suppress cross-polarization, achieving a polarization-insensitive metasurface with a 31.20% maximum aperture efficiency. Second, we propose a highly integrated, dual-polarized metasurface antenna that embeds the DC control circuit directly behind the surface, eliminating external wires. It supports $\pm 60^\circ$ wide-angle beam scanning for dual-linear and dual-circular polarizations using a single linearly polarized feed, reaching 35.35% efficiency. Combining the advantages of low cost, structural simplicity, and high aperture efficiency, these proposed antennas demonstrate significant potential for diverse applications, including satellite communications, radar detection, and RIS-assisted networks.

Invited Speech

17:05-17:25

Title: High-Order Discontinuous Galerkin Method for 3D IC Thermal Simulation with Interfacial Thermal Resistance

Invited Speaker: Dr. Haoqiang Feng, Zhejiang University, China

Abstract: As the integration density of 3D integrated circuits (3D ICs) continues to increase, thermal management has become a key challenge for system reliability. Accurate thermal modeling in these multi-scale architectures is complicated by interfacial thermal resistance, which induces sharp temperature discontinuities across material interfaces. Conventional numerical methods typically require additional degrees of freedom to resolve such discontinuities. This talk presents a 3D thermal simulation framework based on a high-order discontinuous Galerkin method. By directly incorporating interfacial thermal resistance into the numerical flux, the proposed method achieves high-order convergence and stability without increasing the number of global unknowns. We first verify the convergence behavior of the proposed method and

subsequently demonstrate its application to the thermal analysis of GaN power amplifiers. The proposed framework serves as a high-fidelity thermal analysis module within a unified DG-based multi-physics EDA framework.

SC048

17:25-17:40

Title: Multi-Hop Energy Consumption Management and Task Scheduling for Mobile Terminal Computing

Authors: Liu Yang, Weibiao Yi, Jiekai Ke, Yongkun Chen, Kwok L. Chung, Tianxin Lin, Tao Ye, Xinhua Zhao

Presenter: Liu Yang, Guangzhou Institute of Science and Technology, China

Abstract: In emergency scenarios such as wars and natural disasters, base station damage disconnects edge/cloud computing, invalidating conventional computation offloading. Mobile Terminal Computing (MTC) is a promising solution, but existing studies lack joint optimization of clustering and task allocation, ignoring multi-hop forwarding energy loss. This paper proposes an Energy-consumption Managed Task Assignment (EMTA) scheme for MTC systems. EMTA integrates weighted cluster head election (considering residual energy, computing power pooling, and base station distance), multi-hop path selection based on cluster head access capability, and differentiated task allocation matching user energy and computing power. Simulations on MATLAB show EMTA outperforms the traditional ATA strategy: it increases MTC average survival time by 1.16% and doubles task iterations for small/big data services. MTC is more suitable for small/medium tasks, effectively solving task backlogs in emergency communication scenarios with compromised base stations.

SC047

17:40-17:55

Title: Intelligent Collaborative Decision Making for Spectrum Resources in Mission-Agile and Regrouping Scenarios

Authors: Fang Yu, Yuqian Li, Mengchen Yao, Qipeng Tian, Weiqing Zuo

Presenter: Yu Fang, China Research Institute of Radiowave Propagation, China

Abstract: To address the limitations of traditional spectrum decision-making methods in terms of time complexity and decision efficiency in low-interaction and high-adversarial battlefield environments, this paper proposes an intelligent spectrum decision-making method based on adaptive learning. Utilizing multi-agent adaptive learning technology, the method achieves collaborative sharing and rapid adjustment of spectrum resources. The paper constructs a model for unmanned aerial vehicles (UAVs) interfering with enemy targets and designs corresponding optimization objectives and evaluation functions. By improving the MADDPG (Multi-Agent Deep Deterministic Policy Gradient) algorithm, the paper introduces an action evaluation function, effectively resolving the credit assignment problem in multi-agent environments, thereby enhancing the algorithm's learning efficiency and collaborative capabilities. Simulation

experiments demonstrate that the improved algorithm exhibits higher reward values and better interference effects in task-agile scenarios, effectively reducing UAV energy consumption and optimizing interference positions and intensities. This method provides technical support for spectrum resource management and UAV swarm coordination in dynamic battlefield environments, holding significant application value.

SC049

17:55-18:10

Title: GL-CFAN: Global-Local Context-Fused Attention Network for Long-Term Forecasting in Intelligent IoT Sensor Networks

Authors: Tianxin Lin, Jiekai Ke, Zhanliang He, Liu Yang, Tao Ye, Xinhua Zhao, Kwok L. Chung, Xuerong Wu

Presenter: Tianxin Lin, Guangzhou Institute of Science and Technology, China

Abstract: Long-term multivariate time series forecasting is important for intelligent IoT sensor networks, where distributed sensors continuously generate temporal data from energy, environmental, and traffic monitoring systems. However, such sensing data often contain both long-range dependencies and fine-grained local variations, making accurate long-horizon forecasting challenging. To address this issue, this paper proposes GL-CFAN, a Global-Local Multi-Scale Context-Fused Attention Network. The main contribution of GL-CFAN lies in its globallocal dual-branch design. The global branch employs multi-scale dilated local attention to enlarge the temporal receptive field and capture long-range dependencies efficiently. The local branch introduces context-fused attention to integrate static contextual features with dynamic temporal weighting, enabling fine-grained modeling of local sensing variations. In addition, adaptive head weighting is designed to dynamically emphasize informative attention heads and improve temporal representation learning under heterogeneous sensing patterns. Experiments on four benchmark datasets, namely ETTh1, ECL, Weather, and Traffic, demonstrate that GL-CFAN achieves competitive or superior forecasting performance compared with representative long-term forecasting models. Ablation studies further verify that the global branch, local branch, and multi-scale design all contribute to improved forecasting accuracy, confirming the effectiveness of the proposed architecture for intelligent IoT sensor network forecasting.

Poster Session 7: Electromagnetic Field Theory and Microwave Scattering Parameter Measurement Methods

Session Time Period: 09:00-10:24 (GMT+8, Beijing Time), Friday, June 26, 2026

Conference Room: 香樟厅, 1st Floor

Session Chair: Assoc. Prof. Yi Zhang, Sichuan University, China

SC015

09:00-09:06

Title: Design of a Free-standing Dual-Passband Frequency Selective Surface at Ka/W-Bands

Authors: Yuhe Zhao, Zhenchao Xie, Lifei Jiang, Xi Ye, Jinghui Wei, Zhen Li

Presenter: Yuhe Zhao, Shanghai Aerospace Electronic Technology Institute, China

Abstract: This paper proposes a freestanding dual-layer frequency selective surface (FSS) for quasi-optical feed systems to achieve dual-passband transmission at 35 GHz (Ka-band) and 94 GHz (W-band). The proposed FSS eliminates dielectric absorption loss and thermal breakdown in high-power microwave applications. The unit cell adopts a C3-symmetric structure combining central straight slots and sector arc slots. The large arc slots provide significant capacitive loading, pushing the fundamental resonant mode down to 35 GHz within a compact period of 2.65 mm, which helps reduce the grating-lobe risk at the lower passband. Moreover, the straight slots are optimized for higher-order mode transmission at 94 GHz. The simulation results show that the dual-layer configuration provides a transmission loss of less than 0.5 dB in the passbands and a deep transmission zero with over 80 dB isolation between them. Due to the symmetrical topology and compact size, the FSS maintains highly stable transmission at a 15° oblique incidence. Furthermore, electric-field analysis provides a preliminary estimate of the electrical power-handling margin. Fabrication-related factors are also considered. In particular, the sector arc width, the 0.05 mm fillet radius, and the interlayer spacing are treated as controlled dimensions for future prototype preparation.

SC006

09:06-09:12

Title: Design of quarter wavelength coaxial resonator cavity insulating oil micro-water measurement sensor

Authors: Lihong GE, Jin GUAN, Liwei SHAO, Xiaohao ZHAO and Dehe WANG

Presenter: Xiaohao ZHAO, North China Electric Power University, China

Abstract: The micro-water content in insulating oil is an important factor affecting the safe operation of trans-formers. In view of the transformer accident caused by micro-water in insulating oil, a quarter wavelength coaxial resonant cavity was proposed as an on-line monitoring and early

warning sensor for micro-water in insulating oil. Based on the microwave resonant cavity measurement technology, the quarter wavelength coaxial resonant cavity was simulated and designed by HFSS electromagnetic software. Taking transformer insulating oil as the research object, the micro-water measurement experiment of insulating oil was carried out to test the resonant cavity. When the moisture content in the insulating oil is in the range of 0 to 50 PPM, the measurement error of the sensor is less than 1.5%, indicating that the quarter-wavelength coaxial resonant cavity sensor can achieve accurate detection of the moisture content in the insulating oil.

SC030

09:12-09:18

Title: A Modified Metallic Calibrator for Enhanced Low-Frequency RCS Measurement Stability

Authors: Rui Fang, Xiaodong Zhuge

Presenter: Rui Fang, Beihang University, China

Abstract: Accurate calibration of radar cross section (RCS) is fundamental to the fidelity of radar measurements. Traditional metallic spherical calibrators often exhibit undesirable fluctuations in the low-frequency regime, limiting their utility for wideband applications. This paper investigates a novel metallic body characterized by a continuous, smooth geometric profile. Through full-wave electromagnetic analysis utilizing the method of moments, the scattering behavior of this modified geometry is examined and compared against a conventional sphere of equivalent dimension. The analysis demonstrates a notable mitigation of low-frequency variations in the RCS response. Specifically, the proposed design facilitates an extension of the quasi-optical, stable scattering region toward lower operational frequencies. This improvement in low-frequency monotonicity and predictability offers significant practical advantages for enhancing the robustness of wideband radar system calibration.

SC068

09:18-09:24

Title: Dielectric Property Inversion of Biological Tissues Based on the Coaxial Probe

Authors: Ziyu Xu, Yixuan Liu, Funing Liu, Yunpeng Zhang

Presenter: Ziyu Xu, University of Electronic Science and Technology of China, China

Abstract: Conventional dielectric property measurements using open-ended coaxial probes generally rely on quasi-static inversion models and calibration methods based on multiple standard materials, which are limited by inadequate model accuracy and poor calibration stability. In this paper, a full-wave dielectric property inversion model based on the spectral-domain admittance method is developed and investigated. The inversion performance under different modal truncation numbers is evaluated through simulations and compared with that of the quasi-static model. The results

demonstrate that a truncation number of six modes provides an effective trade-off between inversion accuracy and computational efficiency. Furthermore, an improved calibration method based on three calibration states, namely short-circuit, matched-load, and air, is proposed. The proposed method utilizes air as the only dielectric reference material in combination with two mechanical calibration standards, thereby eliminating the need for conventional reference materials such as deionized water during calibration. The effectiveness and accuracy of the proposed calibration technique are further validated through simulation studies. The proposed inversion model and calibration technique provide a reliable basis for accurate dielectric property measurements of biological tissues using open-ended coaxial probes.

SC028

09:24-09:30

Title: A Method for Mitigating the Influence of Zero-Doppler Clutter Suppression on Target Scattering

Authors: Yifan Liu, Xiaodong Zhuge, Mengfei Xiong

Presenter: Yifan Liu, Beihang University, China

Abstract: In turntable-based radar cross section (RCS) measurements and inverse synthetic aperture radar (ISAR) imaging, near-zero-Doppler background components introduced by supporting structures and the test range environment are commonly suppressed using zero-Doppler clutter (ZDC) suppression. However, ZDC suppression inevitably attenuates low-Doppler target scattering components near the rotation center during background suppression, leading to central-region image degradation and deviations in scattering characteristics. To address this issue, this paper proposes a target-response compensation method based on local image-domain replacement for ZDC-suppressed data. For a prescribed ZDC window width, the theoretical replacement radius is first determined from the average power attenuation behavior of an ideal point scatterer. The impaired region is then restored by replacing the corresponding local image-domain region with the raw-image result while retaining the ZDC-suppressed image outside this region. Simulation results for a 90° dihedral target show that the proposed method can preserve the background suppression effect of ZDC suppression while improving the recovery of central-region scattering responses, making the compensated images and RCS curves closer to the ideal far-field results. The proposed method provides a practical means of alleviating target-center scattering distortion without sacrificing the basic background suppression role of ZDC suppression.

SC067

09:30-09:36

Title: A Semi-Empirical Model for Sea-Surface Bistatic Electromagnetic Scattering at Small Incidence Angles

Authors: Xinyi Yin, Yanmin Zhang, Yunhua Wang, Pengbo Du

Presenter: Xinyi Yin, Ocean University of China, China

Abstract: This paper proposes a semi-empirical model for the bistatic normalized radar cross section (NRCS) of the sea surface at small incidence angles. The monostatic and bistatic sea-surface electromagnetic scattering coefficients used in this paper are calculated using the small-slope approximation method. Based on the azimuthal variation characteristics of the bistatic scattering coefficients, different polarization-dependent correction terms are introduced for VV and HH polarizations to improve the description of local features. The results show that, for both L-band and C-band cases, under different wind speeds and bistatic configurations, the proposed model can effectively describe the variation of bistatic sea-surface NRCS with scattering azimuth angle at small incidence angles. Compared with direct numerical calculation of bistatic scattering, the proposed model can provide bistatic scattering results more efficiently, demonstrating good potential for engineering applications.

SC016

09:36-09:42

Title: Simulation of a Submarine's Induced Magnetic Field
Authors: Fengshi Zheng, Xin Wang, Yaoyi Chen, Jiale Peng
Presenter: Yaoyi Chen, National University of Defense Technology, China

Abstract: A simulation model of the static magnetic field around a submarine target was established using COMSOL Multiphysics software. By applying the reduced-field formula and magnetic shielding boundary conditions, the distribution characteristics of the magnetic flux density magnitude at a distance of 300 m directly below the submarine were systematically analyzed under different geomagnetic field orientations. The results indicate that the submarine's disturbed magnetic field is closely related to the orientation of the hull relative to the geomagnetic field. Under vertical conditions, the disturbed field is approximately 18 nT; under parallel conditions, it is approximately 3 nT; and under 45° conditions, it is approximately 10 nT. The results of this paper are consistent with the typical characteristics of the submarine magnetic field at medium and long distances, which verifies the rationality of the model.

SC038

09:42-09:48

Title: Initial Stress Effects on the Dispersion of Coupled Waves in a Piezoelectric Semiconductor Half-Space
Authors: Xiaoxue Li, Chunlong Gu
Presenter: Xiaoxue Li, Lanzhou University of Technology, China

Abstract: This paper investigates the effects of initial stress on the frequency-dependent propagation characteristics of coupled waves in a p-type ZnO piezoelectric semiconductor half-space. Three initial-stress components are considered, namely, the in-plane normal stress, the normal stress along the poling direction, and the initial shear stress. The numerical results show that the QP and QSV branches retain pronounced frequency-

sensitive transition regions, whereas the CP branch remains comparatively insensitive to the applied initial stresses. Among the three stress components, the normal stress along the poling direction produces the most evident modulation of the phase velocity ratios, while the influence of initial shear stress is more pronounced for the QSV branch than for the QP branch. These results indicate that different components of initial stress regulate different coupled-wave branches in distinct ways, and that the normalized phase velocity response provides an effective measure for characterizing the stress-dependent dispersion behavior of piezoelectric semiconductors. The present study may also provide useful guidance for the analysis and design of acoustoelectric devices under initial-stress conditions.

SC019

09:48-09:54

Title: BT-iPML: An Efficient Bilinear Transform PML Independent of Host Media at Code Level

Authors: Kun-Lai Li, Yingda Fu, Weikang Si, Xiaoqian Yu, Zhengpeng Wang, Ziyang Long, and Yongjun Xie

Presenter: Kun-Lai Li, Beihang University, China

Abstract: This paper proposes an efficient perfectly matched layer (PML) algorithm based on bilinear transform (BT) method, termed BT-iPML, for finite-difference time-domain (FDTD) simulations. By restructuring the expressions of PML auxiliary variables, the proposed BT-iPML algorithm effectively isolates the PML absorption terms from the standard field updates, achieving code-level independence from the host media. Subsequently, the BT method is employed to efficiently discretize these independent PML auxiliary variables. Three-dimensional numerical results show that the proposed BT-iPML exhibits superior computational efficiency over widely used PML algorithms without sacrificing absorbing performance.

SC012

09:54-10:00

Title: Joint Amplitude and Phase Error Compensation for Dual-Mode Millimeter-Wave Radar Channels

Authors: Luxia Gan, Ruiyang Wang, Bing Wu*

Presenter: Luxia Gan, Anhui University, China

Abstract: Dual-mode millimeter-wave radar channels inevitably incur amplitude and phase distortions introduced by radio frequency (RF) front-end components such as filters, mixers, and amplifiers. This paper presents a channel amplitude and phase error model and proposes a joint compensation method based on stepped-frequency continuous wave (SFCW) calibration. Channel frequency responses are precisely measured with SFCW signals to design digital equalization filter for joint amplitude and phase calibration. For linear frequency-modulated (LFM) waveforms, prior information on target range and echo delay are exploited to select optimal coefficients from precomputed SFCW equalization tables, achieving dual-

mode adaptive compensation. Experimental results demonstrate that amplitude errors are reduced from ~ 3 dB to below 1 dB, while phase errors are suppressed from $\pm 20^\circ$ to within $\pm 3^\circ$. The method exhibits low complexity and high robustness, which facilitates hardware implementation and permits extension to phased-array MIMO channels calibration.

SC026

10:00-10:06

Title: PGDB-Net: Physics-Guided Dual-Branch Network for Omnidirectional Velocity Estimation from Automotive Radar
 Authors: Bochuan Wu, Xiaodong Zhuge
 Presenter: Bochuan Wu, Beihang University, China

Abstract: Millimeter-wave (mmWave) MIMO radar provides all-weather motion sensing capability. Yet, recovering cross range velocity from a single radar frame remains an open challenge for automotive perception. Existing deep learning methods are predominantly designed for proprietary hardware configurations, which limits their applicability to standardized autonomous driving benchmarks. This paper presents the Physics-Guided Dual-Branch Network (PGDB-Net), a physics guided architecture that decouples spatial localization from kinematic estimation. The proposed network is trained on the Gao et al. [10] public raw ADC automotive dataset with multiframe smoothed velocity labels, confidence-weighted Smooth L1 loss, and Hungarian matching, demonstrating the feasibility of end-to-end single-frame omnidirectional velocity estimation from raw radar waveforms, enabling reproducible benchmarking of full-velocity estimation. The architecture uses dual-branch complex-valued processing and set-prediction decoding. Experimental protocols and evaluation metrics consistent with autonomous driving standards are defined.

SC013

10:06-10:12

Title: Millimeter-Wave Sparse Imaging Based on Limited Jitter Sampling and Energy Adaptive Singular Value Threshold
 Authors: Yan Liu, Chuan Lin, Jun Wang, Xiaojie Qu, Jiajun Li and Xinyi Nie
 Presenter: Yan Liu, Southwest Jiaotong University, China

Abstract: To address aliasing artifacts in millimeter-wave imaging under sparse sampling conditions, this paper proposes a matrix completion method that integrates limited jittered sampling with an energy-adaptive singular value thresholding strategy. A locally perturbed uniform sampling scheme is introduced, and the threshold parameters are adaptively adjusted according to the energy distribution of singular values, enabling effective low-rank reconstruction. Experimental results demonstrate that the proposed method achieves superior imaging performance at low sampling rates.

SC021

10:12-10:18

Title: Artifact Suppression for Microwave Near-Field Imaging of Coupled Targets Based on Complex Exponential Decomposition

Authors: Baige Xing and Xiaodong Zhuge

Presenter: Baige Xing, Beihang University, China

Abstract: Microwave near-field imaging is an effective technique for target perception and structural inspection. However, when compact coupled targets contain adjacent surfaces or cavity-like regions, indirect scattering and mutual coupling may generate strong delayed echoes, leading to false responses and distorted outlines in conventional imaging results. In this paper, a preprocessing method based on complex exponential (CE) decomposition is proposed to suppress such artifact-related components before image reconstruction. The measured frequency-domain signal is represented as a superposition of damped exponential components, from which the phase and propagation-range parameters of individual scattering terms are estimated. The dominant direct-scattering components are then selected according to a dominant phase cluster and a propagation-range threshold derived from the extracted parameter distribution, and the filtered signal is reconstructed for subsequent imaging. In this way, the proposed method reduces image artifacts mainly using the extracted signal features, with only limited geometric guidance when needed. Simulations of two symmetrically arranged closely spaced blocks, two asymmetrically arranged blocks, and a U-shaped target verify that the proposed method effectively suppresses artifacts while preserving the main target contours. A brief analysis also shows that the additional computational burden is moderate and that the method maintains effectiveness under moderate parameter perturbation, making it suitable for integration with conventional back-projection imaging.

SC005

10:18-10:24

Title: Waveguide-to-Microstrip Probe for 110–170 GHz Quasi-Optical Cavity Coupling

Authors: Yunhao Bai, Ziyu Xu, Yixuan Liu, Yunpeng Zhang

Presenter: Yunhao Bai, University of Electronic Science and Technology of China, China

Abstract: Aiming at the difficulties in the design and fabrication of coupling excitation probes for 110–170 GHz quasi-optical cavities, this paper investigates the coupling structure based on waveguide-to-microstrip transition. An integrated structure scheme is proposed, in which a microstrip coupling loop is integrated at the end of an ultra-narrow microstrip line, realizing stable feeding of terahertz signals from a rectangular waveguide to the quasi-optical cavity. The design, fabrication and assembly of the structure are completed, and its effectiveness is verified through experimental testing. The proposed structure is expected to replace

expensive and complicated coaxial coupling structures, and shows promising prospects for engineering applications.

Poster Session 8: Design Methods for High-Power Microwave Devices and Systems

Session Time Period: 10:34-11:58 (GMT+8, Beijing Time), Friday, June 26, 2026

Conference Room: 香樟厅, 1st Floor

Session Chair: Assoc. Prof. Yi Zhang, Sichuan University, China

SC034

10:34-10:40

Title: A Rhombus-Domain PCM Cascaded with a Resistive FSA for Broadband X–Ku-Band RCS Reduction

Authors: Mengfei Xiong, Xiaodong Zhuge and Yifan Liu

Presenter: Mengfei Xiong, Beihang University, China

Abstract: Achieving wide-band radar cross section (RCS) reduction increasingly relies on algorithm-driven design, in which algorithm-based optimization of the surface structure is progressively replacing experience-dependent manual tuning, with further gains attainable by combining the design logic with the intrinsic physical mechanisms of the metasurface. Conventionally, a polarization conversion metasurface (PCM) is encoded as a binary pixel lattice on a square domain, and searches for patterns that maximize the polarization conversion bandwidth across the X and Ku bands. The achievable bandwidth is bounded by how efficiently the square domain accommodates the conversion current paths and by the intrinsic high-frequency cutoff of the conversion mechanism. To relax both limits, the PCM is parameterized on a rhombus-domain lattice whose diagonals coincide with the conversion axis, placing the pixel budget where the conversion currents flow, and a resistive frequency selective absorber (FSA) is cascaded above it. An energy-conservation identity relates the co-polarized reflection to two near-decoupled suppression channels, polarization conversion set by the PCM topology and absorption set by the FSA, whose additive structure justifies a sequential GA optimization, with the FSA tuned while the converged PCM topology is held fixed. The co-polarized reflection of the cascaded cell stays below -10 dB from 6.9 to 17.4 GHz, a 1.34 GHz bandwidth gain and a 3 GHz upper-cutoff extension over the PCM-only baseline. A 4×4 checkerboard array yields specular RCS reductions of at least 16 dB across 10–18 GHz, peaking at 30.6 dB at 14 GHz.

SC054

10:40-10:46

Title: Metamaterial-based Electromagnetic Scattering Manipulation Technology and its Applications

Authors: Jie Guo, Jingyi Hao, Biao Si, Xin Li, and Lv Zhang

Presenter: Jingyi Hao, National Key Laboratory of Scattering and Radiation, China

Abstract: Metamaterials are composite media engineered with sub-

wavelength microstructures to achieve electromagnetic properties not found in natural materials. This paper systematically reviews the research progress of metamaterials in the field of electromagnetic scattering control. It first introduces the fundamental concepts of metamaterials and the theoretical basis of electromagnetic scattering, outlining four developmental stages from theoretical foundation to industrial breakthroughs. The review focuses on analyzing the electromagnetic scattering control mechanisms based on structural design and material properties. The article highlights the broad application prospects of this technology in radar stealth, communication system optimization, and electromagnetic compatibility. Furthermore, it objectively analyzes the current challenges, including bandwidth limitations, material losses, and difficulties/costs associated with micro-nano fabrication. Finally, future development trends are discussed, exploring solutions such as non-resonant designs, dynamically tunable techniques, and advanced manufacturing technologies to overcome these bottlenecks.

SC053

10:46-10:52

Title: Design of Optically Transparent Ultra-Wideband Absorber
 Authors: Ye Fan, Zheng Yuejun, Chen Qiang,
 Presenter: Ye Fan, National University of Defense Technology, China

Abstract: This paper presents an ultra-wideband optically transparent absorber based on indium tin oxide (ITO) and polymethyl methacrylate (PMMA). The proposed absorber adopts an alternately stacked structure of three layers of square-patterned ITO films and PMMA dielectric spacers, with a low-sheet-resistance continuous ITO film serving as the bottom reflective ground. By designing three absorbing units with complementary resonant frequencies and vertically integrating them, a continuous absorption band from 1 to 20 GHz is formed. Full-wave simulation results indicate that under normal incidence, the reflection loss of the proposed absorber is better than -5 dB (corresponding to an absorptivity $> 68\%$) over the entire 1–20 GHz frequency band, yielding a fractional bandwidth of 181%. The structure is insensitive to polarization angles and maintains stable absorbing performance for incident angles up to 30° . Owing to its ultra-wideband absorption, optical transparency, and polarization insensitivity, this absorber is suitable for low-observable and electromagnetic shielding applications on optical windows.

SC063

10:52-10:58

Title: A Broadband Frequency-Reconfigurable Dielectric Resonator Antenna Based on an Open-Loop Ring Feedline with PIN Diode
 Authors: Xinmei Luo, Gongwen Gan
 Presenter: Xinmei Luo, Southwest Jiaotong University, China

Abstract: This paper designs a broadband frequency reconfigurable antenna based on a cylindrical dielectric resonator. To achieve the frequency reconfiguration function, two PIN diodes are symmetrically loaded on the open

ring monopole. By controlling the ON-OFF state of the two diodes, the current distribution on the antenna surface and its electromagnetic coupling characteristics can be effectively changed, thereby enabling flexible conversion between different operating frequency bands. The simulation results show that by electrically controlling the working state of the diodes, the antenna can switch between the 1.68-3.17 GHz (61.4%) and 4.1-6 GHz (37.6%) frequency bands. In both working modes, the antenna's gain is positive, and the radiation efficiency is higher than 80%. Therefore, this antenna has broad application prospects in 4G/5G communication, Wi-Fi/Bluetooth, and C-band satellite communication fields.

SC014

10:58-11:04

Title: Differential-Mode Quasi-Reflectionless Balanced Bandpass Filter Based on Lossy Power Divider

Authors: Wenshan Xie, Guohui Li, Jiabo Qi

Presenter: Wenshan Xie, Shanghai University, China

Abstract: This paper proposes the design of a differential-mode (DM) quasi-reflectionless balanced bandpass filter (BPF). The filter consists of two balanced-to-single-ended (BTSE) lossy power divider (PD) and a filter crossover, and adopts a microstrip-to-slotline (MSTS) transition structure to achieve efficient common-mode (CM) suppression. The DM absorption bandwidth is extended by introducing a stepped-impedance microstrip line before the absorption resistor. Simulation results show that the designed filter achieves greater than 20 dB DM stopband suppression level and greater than 70 dB CM suppression within the passband at a center frequency of 2.41 GHz and a fractional bandwidth (FBW) of 13.7%.

SC009

11:04-11:10

Title: Design of a High-pass Filter with twenty octave bandwidth using MMIC technology

Authors: Wenchao Peng, Jifan Zhang, Hailong Wang

Presenter: Wenchao Peng, Science and Technology on Electronic Information Control Laboratory, China

Abstract: This paper presents the design of an ultra-wideband high-pass filter based on 7-orders Chebyshev associated with ellipse topology. The filter was designed to work at 0.8 to 18 GHz using GaAs substrate with a chip size of 1.6mm×0.8mm. The insertion loss was less than 1 dB in mainly pass band and less than 2.4 dB insert loss was obtained with the edge band of 0.8 GHz. Especially, more than -15dB return loss was also achieved, while the suppression of the filter is better than -42dBc below 0.4 GHz

SC010

11:10-11:16

Title: Design of a Miniaturized Ku-Band Up/Down Converter Module

Authors: Qianyi Shi, Chao Guo

Presenter: Qianyi Shi, Xi'an Research Institute of Navigation Technology, China

Abstract: This paper presents the design and implementation of a Ku-band transmit-receive shared up/down converter module for active phased array radar applications. The receiver uses dual-conversion to down-convert 15.7–16.2 GHz RF to 500 MHz IF, while the transmitter reverses this process. By sharing mixers and filters between channels through switch selection, we simplified the RF chain. Measured results show 19.65 dBm saturated output power, 31.26 dB receive gain, 5.52 dB noise figure, 45 dB attenuation range, and ≥ 50 dBc image rejection. The 80 mm \times 65 mm \times 20 mm module demonstrates feasibility of switch-based multiplexing for compact RF front-ends.

SC060

11:16-11:22

Title: Design of a Trench-Assisted GeTe Phase-Change RF Switch

Authors: Gao Jian, Zheng Yuejun, Shao Yujie, Fu Yunqi

Presenter: Gao Jian, National University of Defense Technology, China

Abstract: Indirectly heated GeTe phase-change material (PCM) RF switches can provide nonvolatile, low-static-power RF routing, but in the conventional stack part of the heater power leaks laterally through the AlN and metal regions before reaching the GeTe channel, increasing the actuation voltage. This paper presents a trench-assisted indirectly heated GeTe RF switch in which low-thermal-conductivity SiO₂ trenches are inserted beside the W micro-heater and the AlN isolation layer to form lateral thermal barriers. Coupled electrothermal simulations show that a 6 V, 70 ns RESET pulse heats the GeTe above 720 °C and the temperature falls below 200 °C within 62.25 ns after the pulse is removed. For SET operation, a 3.6 V, 1 μ s pulse keeps the GeTe above 350 °C for more than 800 ns without remelting. Compared with the conventional heated stack, the trench structure raises the GeTe peak temperature by about 190 °C under the same RESET pulse and by about 90 °C under the same SET pulse. Full-wave electromagnetic simulations show an insertion loss below 0.36 dB and an isolation above 18 dB from 1 to 40 GHz, with de-embedded extracted $R_{on} \approx 3.5 \Omega$, $C_{off} \approx 5.0$ fF, and $F_{co} \approx 9.1$ THz. These results indicate that the proposed trench-assisted structure can improve the electrothermal efficiency of GeTe PCM RF switches while maintaining good RF performance, and the proposed design is compatible with reported indirectly heated GeTe PCM switch fabrication processes.

SC051

11:22-11:28

Title: LLM Agent-Driven Fully Automated Inverse Design for Microwave Beamforming Networks

Authors: Xinyan Fu, Tao Huang*, Wenkai Deng, Wentao Xu, Rui Sun, Guanjie Lin, Xiaolin Jin

Presenter: Xinyan Fu, University of Electronic Science and Technology of China, China

Abstract: In this paper, a fully automated inverse design framework driven by a Large Language Model (LLM) agent is proposed for microwave beamforming networks (BFNs). At the algorithm level, a domain-specific tool is established by integrating a Deep Convolutional Neural Network (Deep-CNN) surrogate model and the Genetic Algorithm (GA) for optimal solution searching under user-specified requirements. Furthermore, Gemini 2.0 Flash is employed as the central controller to autonomously parse natural language commands and invoke underlying algorithms for optimal topology discovery. A pixelated microstrip beamforming network is designed based on this framework, which verifies the feasibility and effectiveness of the proposed framework.

SC080

11:28-11:34

Title: Design of a Three-Dimensional System in Package Interconnect Architecture Using Copper-System Low-Temperature Co-Fired Ceramic and Defected Ground Structure for Ka-Band Multi-Beam Receiver Module

Authors: Xuyang Wang, Xiaoyang Zhang, Xiaoli Wang, and Yanan Zhang

Presenter: Xuyang Wang, China Academy of Space Technology (Xi'an), China

Abstract: This paper presents a three-dimensional system in package (SiP) interconnect architecture for a Ka-band multi-beam receiver module to meet the demands for high integration and low-loss interconnects in modern active electronically scanned arrays (AESA). The proposed architecture heterogeneously integrates multilayer copper-system low-temperature co-fired ceramic (LTCC) substrates with a metal air-filled coaxial structure, which provides high-density connectivity for four-channel input and eight-beam output interconnects within the antenna module's compact projection area. In this paper, the transmission and transition structures within the interconnection architecture are simulated, including the vertical transmission structure in the multilayer substrate, and the defected ground structure (DGS) is used to optimize the transition structure from large-size air coaxial probes to multilayer substrates. Simulation results demonstrate that within the 27.5-30 GHz, the RF input circuits achieve a reflection coefficient below -21.7 dB with an insertion loss of less than 0.45 dB, while the output circuits exhibit a reflection coefficient below -21.3 dB and an insertion loss of less than 0.23 dB. In addition, the isolation between circuits exceeds 42.3 dB. These results validate that the proposed architecture meets the requirements for low earth

orbit (LEO) satellite communications and high-density RF front-end applications.

SC035

11:34-11:40

Title: A 9–13 GHz Dual-Polarization Receiver Front End with Low-Phase-Variation Gain Control

Authors: Bowen Xia, Yiping Shangguan, Hao Wang, Chunying Sun, Shixian Zhang, Yishu Liang, Dianwei Zhang, Wu Wen

Presenter: Bowen Xia, Peking University, China

Abstract: This paper presents a 9–13 GHz dual-polarization receiver front end (RXFE) with low-phase-variation gain control. The proposed front end employs bias-based polarization control to enable dual-polarization operation without using standalone switches, minimizing insertion loss and noise degradation. A low-phase-variation gain-control scheme is included to adapt to varying input levels without additional variable-gain amplifiers (VGA). The gain control uses a single current DAC to control the base voltage, minimizing the circuit footprint. The proposed RXFE achieves 15.0–17.4 dB gain and 2.3–3.2 dB noise figure in the 9–13 GHz frequency range, and the gain control range exceeds 27 dB with low phase variation. The proposed RXFE is suitable for low-cost Ku BSS-band (10.7 GHz to 12.7 GHz) satellite receiving arrays, enabling full-solid-state multi-constellation applications.

SC081

11:40-11:46

Title: A V-band hermetically sealed System-in-Package interconnect assembly based on copper-based LTCC

Authors: Zhipeng Zhang, Bin Li, Yanan Zhang, Guojin Wang and Qian Song

Presenter: Zhipeng Zhang, China Academy of Space Technology (Xi'an), China

Abstract: In response to the urgent demand for highly integrated, highly reliable hermetic packaging in satellite communications and millimeter-wave systems, a V-band waveguide-to-substrate integrated coaxial line (SICL) and chip interconnect integrated module was designed based on YK33 copper-based low-temperature co-fired ceramic (Cu-LTCC). By leveraging the natural match between the four-layer LTCC dielectric thickness and the guide wavelength in 67 GHz, a fully embedded self-matching shorting structure was achieved, eliminating the need for traditional external metal shorting components. To meet system-in-package (SiP) requirements, the transmission structure from the substrate-integrated coaxial line to the grounded coplanar waveguide, as well as the gold wire bonding compensation structure for the chip, were also investigated. Furthermore, this solution establishes a compact, hermetically sealed interconnection architecture through the direct soldering of the waveguide port to the ceramic substrate. Finally, a physical prototype was fabricated and measured. The results indicate that within the 66.5–67.5 GHz frequency band, the end-to-end

return loss—including waveguide conversion, planar transmission, and gold wire bonding—is better than 15 dB, and the insertion loss is less than 3 dB, providing a miniaturized solution for integrated millimeter-wave hermetic front-ends.

SC040

11:46-11:52

Title: Design and Failure Mechanism Analysis of a DC-4 GHz Limiter Based on GaN SBD

Authors: Shuaiying Hou, Qiyu Chen, Tianhao Ren, Lingfeng Kang, Zejia Deng, Gengxin Lin, Yukun Han, Jianxin Ning, Jianzhong Chen, Jianping Zeng
Presenter: Shuaiying Hou, Microsystem and Terahertz Research Center, China Academy of Engineering Physics, China

Abstract: In this work, a DC-4 GHz wideband limiter is designed based on a field-circuit co-design approach. The limiter is evaluated under high-power microwave pulse injection at 2.9 GHz with a pulse width of 100 ns and a repetition rate of 50 Hz. Measurement results show that during a 3-second continuous pulse injection, the output power is effectively limited below 20 dBm when the input power is 46.76 dBm. However, when the input power increases to 49.27 dBm, the limiter fails permanently. To investigate the failure mechanism, multiphysics co-simulation is carried out on the GaN Schottky barrier diode and the input bonding wires, which indicates the limiter fails due to bonding wire burnout and device thermal breakdown.

SC020

11:52-11:58

Title: Design and Study of Output Windows for an L-Band Continuous-Wave Broadband Klystron

Authors: Zhewen Cheng, Dongfeng Li, Xiu Liu

Presenter: Zhewen Cheng, Beijing Vacuum Electronics Research Institute, China

Abstract: This paper presents the design and comparative evaluation of pillbox window and long-tapered window for an L-band broadband continuous-wave (CW) klystron. The results show that the pillbox window achieves a voltage standing wave ratio (VSWR) below 1.1 over a bandwidth of 100 MHz, it can meet the engineering requirement of 150 kW CW operation, and the cold test results are consistent with the design predictions. The long-tapered window effectively reduces the local peak electric field on the ceramic disk, the dielectric-loss power density, and the center-to-edge temperature difference, exhibiting greater power-handling potential under higher CW power conditions. However, the effective operating bandwidth of the long-tapered window is restricted by ghost modes. The overall comparison indicates that, the pillbox window is suitable for the present L-band broadband CW klystron targeting 150 kW output power and 100 MHz bandwidth, while the long-tapered window can be considered as candidate for higher power levels.

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