October 22 (TUE)	**PM**	13:30-21:00	14:00-18:00			
		Registration Room E, 1st Floor	Workshops (Free for charge)	1. Latest Progress in Millimeter Wave Antennas, Room A, 2nd Floor 2. Reflect array Technology: From Fundamentals to Recent Advances, Room B, 2nd Floor		
	18:30-21:30	Welcome Reception				
October 23 (WED)	**08:00-09:00**	Registration, 1st Floor				
	09:00-09:30	Opening Ceremony, Room F, 2nd Floor				
	09:30-10:00	Coffee Break, 2nd Floor				
	10:00-12:00 **Keynote Speech** Room F, 2nd Floor	10:00-10:40	A teleco's view for better and better customer expectations in multi-band, multi-network, multi-device and multi-demand smart society	Dr. Shinichi Nomoto	Chaired by Prof. Le-Wei Li	
		10:40-11:20	4G/Multiband Handheld Device Antennas and Their Antenna Systems	Prof. Kin-Lu Wong		
		11:20-12:00	Rethinking the Wireless Channel for OTA testing and Network Optimization by Including User Statistics: RIMP, Pure-LOS, Throughput and Detection Probability	Prof. Per-Simon Kildal		
	12:00-13:30	Lunch				
	Place	**Room A, 2nd Floor**	**Room B, 2nd Floor**	**Room C, 2nd Floor**	**Room D, 1st Floor**	
	13:30-15:10	WP-1(A) Adv Ant for Radio-Astr. -1	WP-1(B) New Strategies of CEM-1	WP-1(C) UWB Antennas	WP-1(D) Compact Antennas	
	15:10-16:00	Poster Session: **WP-C(Best Student Papers Contest)** & WP-P & Coffee Break (Room E, 1st Floor)				
	16:00-17:40	WP-2(A) Adv Ant for Radio-Astr. -2	WP-2(B) New Strategies of CEM-2	WP-2(C) Broadband Antennas	WP-2(D) Small Antennas	
October 24 (THU)	**08:00-09:40**	TA-1(A) EurAAP/COST	TA-1(B) Computational EM	TA-1(C) WLAN Antennas	TA-1(D) Measurements	
	09:40-10:30	Poster Session: TA-P &Coffee Break (Room E, 1st Floor)				
	10:30-12:10	TA-2(A) Wireless Power Transmis.	TA-2(B) EM Scattering	TA-2(C) Patch Antennas	TA-2(D) Radio Propagation	
	12:10-13:30	Lunch				
	13:30-15:10	TP-1(A) Body-central Antennas	TP-1(B) SIW Antennas & Devices	TP-1(C) Reflector & Air-fed Array	TP-1(D) Mobile & Indoor Propag.	
	15:10-16:00	Poster Session: TP-P & Coffee Break (Room E, 1st Floor)				
	16:00-17:40	TP-2(A) Body-central Propagation	TP-2(B) Integrated MMW Antennas	TP-2(C) Array for Radar Systems	FP-1(D) Wire Antennas	
	18:30-21:30	Banquet & Best Student Papers Award (Room F, 2nd Floor)				
October 25 (FRI)	**08:00-09:40**	FA-1(A) A &P for Mobile Comm.	FA-1(B) MMW & THz Antennas	FA-1(C) Ant. Analysis & Synthesis	FA-1(D) EM in Circuits-1	
	09:40-10:30	Poster Session: FA-P & Coffee Break (Room E, 1st Floor)				
	10:30-12:10	FA-2(A) A &P for MIMO Comm.	FA-2(B) MMW Antennas	FA-2(C) Freq. Selective Surface	FA-2(D) EM in Circuits-2	
	12:10-13:30	Lunch				
	13:30-15:10	FP-1(A) Antennas for RFID	FP-1(B) Inversed Scattering	FP-1(C) Slot Antennas	FP-1(D) A&P in Mata-structures	
	15:10-16:00	Poster Session: FP-P & Coffee Break (Room E, 1st Floor)				

2013 International Symposium on Antennas and Propagation (ISAP2013)

Final Technical Program

October 23-25, 2013

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Table of Contents

Message from the General Chairmen ..... - 1 -
ISAP2013 Committee Officers ..... - 2 -
ISAP2013 IAC Members ..... - 3 -
ISAP2013 TPC Members ..... - 4 -
ISAP2013 Secretariat Staff ..... - 6 -
Conference Site and Office Location ..... - 7 -
General Information ..... - 9 -
ISAP2013 Online ..... - 10 -
Workshop ..... - 11 -
Keynote Speech ..... - 23 -
ORAL Session: WP-1(A) , WP-2(A) ..... - 29 -
ORAL Session: WP-1(B), WP-2(B) ..... - 30 -
ORAL Session: WP-1(C), WP-2(C) ..... - 31 -
ORAL Session: WP-1(D), WP-2(D) ..... - 32 -
POSTER Session: WP-C(Best Student Papers Contest) ..... - 33 -
POSTER Session: WP-P ..... - 34 -
ORAL Session: TA-1(A), TA-2(A) ..... - 35 -
ORAL Session: TA-1(B), TA-2(B) ..... - 36 -
ORAL Session: TA-1(C), TA-2(C) ..... - 37 -
ORAL Session: TA-1(D), TA-2(D) ..... - 38 -
POSTER Session: TA-P ..... - 39 -
ORAL Session: TP-1(A), TP-2(A) ..... - 41 -
ORAL Session: TP-1(B), TP-2(B) ..... - 42 -
ORAL Session: TP-1(C), TP-2(C) ..... - 43 -
ORAL Session: TP-1(D), TP-2(D) ..... - 44 -
POSTER Session: TP-P ..... - 45 -
ORAL Session: FA-1(A), FA-2(A) ..... - 47 -
ORAL Session: FA-1(B), FA-2(B) ..... - 48 -
ORAL Session: FA-1(C), FA-2(C) ..... - 49 -
ORAL Session: FA-1(D), FA-2(D) ..... - 48 -
POSTER Session: FA-P ..... - 51 -
ORAL Session: FP-1(A) ..... - 53 -
ORAL Session: FP-1(B) ..... - 54 -
ORAL Session: FP-1(C) ..... - 55 -
ORAL Session: FP-1(D) ..... - 56 -
POSTER Session: FP-P ..... - 57 -
Note ..... - 59 -
Floorplan ..... - 60 -

* Session papers format:

Time (for Oral) or Paper No. (for Poster) // Paper Title // Author(s) // from Country or Region

Message from the General Chairmen

The ISAP2013 will be held in Nanjing, China on October 23-25, 2013. On behalf of the conference committees, it is our pleasure to welcome all of you to attend the 2013 International Symposium on Antennas and Propagation (ISAP2013) in Nanjing, one of the most beautiful and ancient cities in China.

The 2013 International Symposium on Antennas and Propagation (ISAP2013) provides an international forum for exchanging information on, and updating progresses of, the most recent research and development in antennas, propagation, electromagnetic wave theory, and other related fields. It is also an important objective of this meeting to promote professional networking among conference participants.

Nanjing was awarded the title of Famous Historic and Culture City because she had been Capitals of China for ten times. Today, Nanjing is the Capital City of Jiangsu Province and one of the important wireless communication hubs in China. The ISAP2013 is sponsored and organized by Southeast University, co-sponsored by University of Electronic Sci. & Tech. of China, and technically co-sponsored by CIE Antenna Society, the IEICE Communications Society, IEEE Antennas and Propagation Society, the European Association on Antennas and Propagation (EurAAP), Laboratory of Science and Technology on Antenna and Microwave, IEEE AP/MTT/EMC Nanjing Joint Chapter, the Jiangsu Institute of Electronics, Journal of Microwaves, etc.

ISAP2013 totally received 420 submissions, and finally 359 papers are accepted after its rigorous peer reviews by TPC members based on their technical merits and interests to the antennas and propagation communities. Among a large number of students' papers, 15 papers were selected by the TPC into the final-list for the best student paper contest.

Finally, please enjoy technical sessions of the conference, and also the Chinese culture in, and the beautiful modern city scenery of, the ancient Nanjing.

Prof. Wei Hong, Prof. Joshua Le-Wei Li, and Prof. Shuxi Gong
General Co-Chairs

October 23, 2013

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Conference Site and Office Location

2013 International Symposium on Antennas and Propagation (ISAP2013) will be held on October 23-25, 2013, at Jiangning Exhibition Center, Nanjing, China. The office and session locations are shown in the back cover of this program.

Registration

The ISAP2013 registration begins on October 22, 2013. The registration desk is at Jiangning Exhibition Center on October 22 and October 23. The on-site registration fee is shown in the following table. The on-site student registration requires a valid student ID. If you have pre-registered, your name badge and Technical Program will be ready for you to pick up at the registration desk during the conference. Please wear your name badge throughout the conference. Access will be prohibited to the exhibition, tea break, interactive areas, and technical sessions if a name badge is not visible.

	On-site
Student/Retired Participants	2200 CNY (350 USD)
CIE/IEICE/IEEE member	3100 CNY (500 USD)
Regular Participants	3400 CNY (550 USD)

Projection Facilities

Standard LCD projector (connected to a local PC) will be provided in each conference room. If you need an overhead projector, please contact the conference office.

Guidelines for Presentations

INFORMATION FOR ORAL PRESENTERS

Presenters are required to report at their session room and to their Session Chair at least 15 minutes prior to the beginning of their session. Presenters are suggested to try out their presentations if there is any concern about the format, presentation length, etc. It is mandatory that the presentations should be loaded to the computer supplied by conference committee before the beginning of each session. Any delays in the start of a presentation behind schedule due to the presenter's disregard of this guidance will result in less presentation time for that paper.

All presentations are limited to 20 minutes in their entirety. The strict limits are 15 minutes for the formal presentation and 5 minutes for questions and discussions. To accommodate attendees who move between sessions, it is important to carry out every presentation on schedule. The Session Chair will remind the presenter 15 minutes after the presentation starts.

The session room will be equipped with a computer and an LCD projector. This is the only permissible projection system. Presenters must use the session's computer for their presentation, i.e., their presentation must be loaded in advance on this computer. Other computers will not be permitted. Each computer is equipped with a CD-ROM drive and a USB port to read CDs and USB flash memory, respectively. If you have a special requirement to use an overhead projector, please contact with the conference office at least one hour prior to the start of their session.

The operating system for session computers is Microsoft Windows XP (or newer). The softwares available on each machine are Adobe Acrobat Reader (for PDF), MathType and Microsoft Office that includes Word, Excel, and PowerPoint. Therefore, all presentations must be compatible with these packages. There will be also assistance and advice available to presenters at registration desk.

Please remember that the responsibility of having your paper ready for presentation at the scheduled time is primarily in your hands. Due to the very large number of papers and a very tight schedule, we cannot tolerate delays due to presenters' inadequate preparations. .

INFORMATION FOR POSTER SESSION PRESENTATIONS

Presenters are required to put up their papers 15 minutes prior to the beginning of their session. Each poster presentation will last about 50 minutes. During this time, the presenter must stand by the display board to answer questions and discuss about the contents of the poster informally.

The poster display should include a statement of the topic, objectives of the research or project, the methodology used to solve the problem or implement the program, the major findings or outcomes and their significance, and conclusions. There should be a logical sequence -- introduction, development, and conclusion -- of your display. Each sheet should be numbered. A heading should be prepared for your presentation using lettering at least 3cm high. The heading should include the title of the poster ,all author names and institutional affiliations. Your poster abstract should appear in the top left-hand corner of the board. Lettering should be simple, bold, and easily legible from a distance of one meter.

Two poster boards are provided for each presentation, which is 1.8 meter high by 0.9 meter wide. The background color of the board is usually beige or white. Pins or tapes are provided by conference committee to mount your posters on the boards. All materials to be displayed should be prepared before you arrive. Supplies will not be available at the conference site.

General Information

CONFERENCE VENUE

ISAP2013 will be held at Jiangning Exhibition Center, Nanjing, China
Address: No. 1528 Shuanglong, Jiangning District, Nanjing, China

TRANSPORTATION

Please refer to the website:
http://www.emfield.org/ISAP2013/ for details.

ABOUT Nanjing

Nanjing is the capital of Jiangsu Province. It lies in the lower reaches of the Yangtse River, covering 6.5 thousand square kilometers, with a population of 5.1 million. Perennial temperature averages 17.8 ℃ (64 °F). Nanjing is one of the important hub of communications in China. The railway, highway and aviation are all convenient. Nanjing had been awarded the title of Famous Historic and Culture City.

Being one of China's six ancient capitals and cultural centers, it was built 2400 years ago and was the capital of six dynasties-the Eastern Wu, the Eastern Jin, the Song, the Qi, the Liang, the Chen, the Southern Tang and the early Ming dynasties. Nanjing had the world's longest city wall-extending 34 km. The Xiaoling Tomb was listed in the World Heritage.

The Mausoleum of Dr. Sun Yat-sen is situated on the southern slope of the Purple Mountain in the eastern suburb of Nanjing. The mausoleum, shaped like an alarm bell, is built at the foot of the mountain.

Plum Blossom Hill is one of the eight best places for enjoying the plum blossom in China.

Qinhuai River is the cradle of civilization around Nanjing. Dozens of Neolithic primitive sites have been unearthed along the river. It is famous for the wealth of ancient sites, gardens, painted boats, streets and folklore. Historically, the place teemed with nobles and men of letters. At its peak years during the Ming and Qing dynasties, Qinhuai was bustling with businessmen, whorehouses and racing lantern boats.

On the bank of Qinhuai River, there is the Confucius Temple, a famous tourist resort in Nanjing. It is also known as Fuzimiao in Chinese.

And also, there are numerous mountains, lakes and other views in Nanjing. Zhong Mountain and Xuanwu Lake are the national major place of interest. They are the most magnificent scenery in China.

More about Nanjing please visit the following websites: www.nju.gov.cn/english/

LANGUAGE

The official language for the Conference is English. However, in the public society, Chinese

mandarin is commonly spoken in Nanjing.

VISA

Each person from abroad, who wants to enter the Chinese Customs, needs to hold a visa issued by Chinese Embassy or Consulate. It should be submitted to the Chinese Embassy in your country for you to apply for the visa. You can also apply for a visa type of common tourist, which is convenient to be issued without the requisition form and valid for 30 days.

CURRENCY AND CREDIT CARDS

China's currency is RMB with its monetary unit RMB Yuan. The exchange rate is about 1 USD FOR 6.2 RMB. ONLY RMB cash is acceptable on the registration desk on the conference site. This is also the case in most large shopping centers and other hotels.

TAX AND TIP

All the shopping is free of tax. Be sure to make big bargaining when buy merchandise from the Street Market. Tipping is by no means a traditional Chinese custom. Please help keep the good custom and do not tip a waiter/waitress or a taxi driver and other person who provides regular service.

OPENING HOURS

Bank and Post Office Opening hours: 9:00 a.m. to 5:00 p.m., from Monday to Sunday. Government Office Opening hours: 8:00 a.m. - 5:00 p.m., from Monday to Friday. Store Opening hours: usually 9:00 a.m. to 8:00 p.m., but the large shopping center serves till 10:00 p.m., from Monday to Sunday.

ELECTRICITY

In China, the standard outlets provide AC of 220 V/50 Hz.

TAXI

Usually, a taxi is available along the roadsides, while you wave for it. However, at main streets it is only available at taxi stops or in front of a hotel.

INTERNET ACCESS

There are WLAN with internet access in the conference venue.

ISAP2013 Online

Information on ISAP2013 has been posted on the World Wide Web at
http://www.emfield.org/isap2013

Workshop

October 22 (TUE) 14:00-18:00

Room A, 2nd Floor

Latest Progress in Millimeter Wave Antennas

Chair: Prof. Zhi Ning Chen

National University of Singapore

1. **A Low-Cost Low-Profile Printed Millimeter-Wave Antenna Array**
   Prof. Kwai-Man Luk
   City University of Hong Kong

2. **Recent Advances in High-efficiency Millimeter-wave Band Planar Antennas**
   Prof. Jiro Hirokawa
   Tokyo Institute of Technology

3. **Helpful Techniques for the Design of General Near-Field Focused Phased Array Antennas: from Fundamentals toward Antenna Realization**
   Prof. His-Tseng Chou
   Yuan Ze University

4. **Substrate-integrated Millimeter-Wave Antennas**
   Prof. Zhi Ning Chen
   National University of Singapore

A Low-Cost Low-Profile Printed Millimeter-Wave Antenna Array (Invited)

Kwai Man Luk
State Key Laboratory of Millimeter Wave,
City University of Hong Kong, Kowloon, Hong Kong, P R China

SUMMARY

WITH the availability of low-cost millimeter-wave circuits and components, various wireless applications have been proposed, including the 60-GHz unlicensed short range data links [1], the 77-GHz automotive radar [2], and the 94-GHz imaging radar [3]. Due to high free-space propagation loss and strong atmospheric absorption, the distance of communications of these applications cannot be too large. To mitigate this problem, high-gain antennas are preferable for these applications.

Several high-gain antenna arrays were proposed recently [4]–[8] for 60- GHz applications such as the high definition multimedia interface, high definition video streaming, high-speed internet, wireless gigabit Ethernet, and so on. These antennas are complex in structure and ought to be made of multi-layer substrates which is high in production costs,

In this talk, a new unidirectional antenna element consisting of a directed planar electric dipole and a double-loop antenna is presented. Design of high gain antenna arrays based on this new antenna element is followed. The antenna arrays are constructed using a single-layer printed circuit board substrate and are designed to operate at 60-GHz band. They have a low profile of $\mathbf{0.05\lambda_0}$ (λ_0 is the wavelength referring to 60GHz) and exhibit wide impedance bandwidths and high gains. The design procedure, antenna geometry and principle of operation for 4-element, 14-element and 50-element antenna arrays are discussed.

ACKNOWLEDGMENT

The authors would like to thank Mr. Mingjian Li for his contribution to this research work, which was supported by a grant from the Research Grants Council of the Hong Kong SAR, China. [Project No. CityU 9041677]

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Kwai-Man Luk received the B.Sc.(Eng.) and Ph.D. degrees in electrical engineering from The University of Hong Kong in 1981 and 1985, respectively. He joined the Department of Electronic Engineering at City University of Hong Kong in 1985 as a Lecturer. Two years later, he moved to the Department of Electronic Engineering at The Chinese University of Hong Kong where he spent four years. He returned to the City University of Hong Kong in 1992, and he is currently Chair Professor of Electronic Engineering and Director of State Key Laboratory in Millimeter waves (Hong Kong). His recent research interests include design of patch, planar and dielectric resonator antennas, and microwave measurements. He is the author of 3 books, 9 research book chapters, over 300 journal papers and 220 conference papers. He was awarded 5 US and more than 10 PRC patents on the design of a wideband patch antenna with an L-shaped probe feed. He was Technical Program Chairperson of the 1997 Progress in Electromagnetics Research Symposium (PIERS), General Vice-Chairperson of the 1997 and 2008 Asia-Pacific Microwave Conference, General Chairman of the 2006 IEEE Region Ten Conference, Technical Program Co-Chairperson of 2008 International Symposium on Antennas and Propagation, and General Co-Chairperson of 2011 IEEE International Workshop on Antenna Technology. Professor Luk received the Japan Microwave Prize, at the 1994 Asia Pacific Microwave Conference held in Chiba in December 1994 and the Best Paper Award at the 2008 International Symposium on Antennas and Propagation held in Taipei in October 2008. He was awarded the very competitive 2000 Croucher Foundation Senior Research Fellow in Hong Kong. He received the 2011 State Technological Invention Award (2nd Honor) of China. He was a Chief Guest Editor for a special issue on "Antennas in Wireless Communications" published in the Proceedings of the IEEE in July 2012. He is a Deputy Editor-in-Chief of PIERS journals. Professor Luk is a Fellow of the Chinese Institute of Electronics, PRC, a Fellow of the Institution of Engineering and Technology, UK, a Fellow of the Institute of Electrical and Electronics Engineers, USA.

Recent Advances in High-efficiency Millimeter-wave Band Planar Antennas (Invited)

Jiro Hirokawa
Tokyo Institute of Technology, S3-20, 2-12-1 O-okayama, Meguro-ku, Tokyo 152-8552, Japan

SUMMARY

This talk covers the recent advances in two types of millimeter-wave planar antennas in Tokyo Institute of Technology.

One is on a patch antenna placed on a thick resin layer on the opposite side of a CMOS RF circuit in a silicon chip and fed through a hole with coaxial-line structure in the 60GHz band [1]. The thick resin layer of 200μm thickness can enhance the radiation efficiency. The connection loss between the antenna and the RF circuit is expected to be small. We design and fabricate a patch antenna over a 5 mm square silicon chip. The simulated connection loss is 0.2 dB, and the radiation efficiency including the connection loss is 76.4%. The high antenna efficiency of 77% was measured by a reverberation chamber with ±3% error [2].

The other is on plate-laminated hollow-waveguide corporate-feed slot array antennas [3]. Etching of the laminated plates gives high precision of about 20μm. Diffusion bonding gives perfect electric contact. The broad band characteristic of about 20% has been achieved by controlling many parameters with fast analysis of the method of moments, which can cover almost communication systems in the millimeter-wave bands such as fixed wireless access system [4]. In the 120GHz band, A 32x32-element array shows 38 dBi gain with 70% antenna efficiency over 13 GHz bandwidth and a 64x64-element array shows 43 dBi gain with 60% antenna efficiency over 13 GHz bandwidth, respectively [5]. High gain more than 40dBi can be achieved with keeping high antenna efficiency and wide bandwidth.

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Jiro Hirokawa was born in Tokyo, Japan, on May 8, 1965. He received the B.S., M.S. and D.E. degrees in electrical and electronic engineering from Tokyo Institute of Technology (Tokyo Tech), Tokyo, Japan in 1988, 1990 and 1994, respectively. He was a Research Associate from 1990 to 1996, and is currently an Associate Professor at Tokyo Tech. From 1994 to 1995, he was with the antenna group of Chalmers University of Technology, Gothenburg, Sweden, as a Postdoctoral Fellow. His research area has been in slotted waveguide array antennas and millimeter-wave antennas. He received an IEEE AP-S Tokyo Chapter Young Engineer Award in 1991, a Young Engineer Award from IEICE in 1996, a Tokyo Tech Award for Challenging Research in 2003, a Young Scientists' Prize from the Minister of Education, Cultures, Sports, Science and Technology in Japan in 2005, a Best Paper Award in 2007, a Best Letter Award in 2009 from IEICE Communications Society and Asia Pacific Microwave Conference prize in 2011 and 2012. He is a Fellow of IEEE and a Senior Member of IEICE.

Helpful Techniques for the Design of General Near-Field Focused Phased Array Antennas: from Fundamentals toward Antenna Realization (Invited)

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SUMMARY

Due to the electromagnetic field's nature in the millimeter wave band, the technologies are expected to be implemented in the short range applications such as car collision avoidance systems or the indoor communication systems. Its bottlenecks of high energy attenuations and multipath field cancellation within a few millimeters of propagation have obstructed it from the successful realization because a slight location shift may experience a complete null signal. The measure to overcome this communication deficiency would be the applications of phased array antennas implemented in terms of MIMO or smart antenna systems, which may help to create space, polarization or angular beam diversities.

To effectively realize the antenna design, our research team has attempted to build up the required technologies especially for the applications of short range communications. A scenario of near-field focused antenna radiation is thus defined, which provides a most global scope of antenna characteristics. In particular, we have built up the fundamentals in terms of ray theories which provide the advantages of easy and physical appealing wave interpretation. Afterward, a sequence of numerical techniques realized as the design tools have also been developed, which are used to design the antenna from a different aspect. In this study, a domain transformation technique has been developed to investigate the antenna design scenario from the point of view in an alternative domain. Based on an application scenario, a phased array antenna has been realized to demonstrate the utilization of these numerical techniques. The advantages of these techniques are that they may be used to effectively reduce the multipath interferences outcome from the wave propagation indoor. Also with a proper implementation, the propagation effects can be incorporated in the design stage of antennas.

The talk will first discuss the fundamental wave phenomena in terms of ray optics, some of them have not been explored in the conventional array theories. Afterward, I will step-by-step present the developed techniques which will be very helpful to realize an extremely large array of antennas from the incubation of an application scenario toward a realistic antenna design.

Prof. Hsi-Tseng Chou received his B.S. degree in electrical engineering from National Taiwan University in 1988, and his M.S. and Ph. D. degrees in also electrical engineering from Ohio State University (OSU) in 1993 and 1996, respectively. He is a professor in Yuan Ze University, Taiwan since 1998. He is also currently an adjunct CTO for Wha-Yu Industrial Corp in the antenna development.

Dr. Chou joined ElectroScience Laboratory (ESL) in OSU as a graduate research associate during 1991-1996 and as a post-doctoral researcher during 1996-1998. After joining YZU in 1998, he had also simultaneously been technical consultants to several industries including Wistron NeWeb, Zinwell, Jonsa and Skstech. His research interests include wireless communication network, antenna design, antenna measurement, electromagnetic scattering, asymptotic high frequency techniques such as Uniform Geometrical Theory of Diffraction (UTD), novel Gaussian Beam techniques, and UTD type solution for periodic structures.

Dr. Chou has received many national awards to recognize his distinguished contributions in the technological developments. Some important ones includes a young scientist research award from Academia Sinica of Taiwan, a distinguished contribution Award in promoting inter- academic and industrial cooperation from Ministry of Education, distinguished engineering professor award from the Chinese Institute of Engineers, distinguished electrical engineering professor award from the Chinese Institute of Electrical Engineering, and University's Industrial Economics Contribution Award and National Award for Industrial Innovation—Key Technology Elite Award both from Ministry of Economics. Prof. Chou was elected in 2004 as one of the nation's ten outstanding young persons by Junior Chamber International, in 2005 a National Young Person Medal from China Youth Corps of Taiwan, and as one of the top 10 rising stars in Taiwan by Central News Agency of Taiwan. He has served as the chair of IEEE AP-S Taipei Chapter and received the best chapter award in 2012. He also received outstanding branch counselor awards from IEEE including IEEE headquarter, R-10 and Taipei Section, respectively.

Prof. Chou has published more than 350 journal and conference papers. He is an IEEE Fellow and IET Fellow, and an elected member of URSI International Radio Science US commission B.

Substrate-integrated Millimeter-Wave Antennas (Invited)

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SUMMARY

Recently millimeter wave (mmW) technology has become a hot topic in high speed wireless communications, high resolution imaging system and vehicular radar systems. In such mmW-band systems, due to high operating frequency antenna design has many unique challenging issues, such as high losses and integration into other circuits. The changes push us to rethink about the issues related to design, materials and fabrication process in mmW antenna engineering.

The materials used in design of mmW antennas should be acceptable in terms of loss typically at an order of loss tangent of 0.001. The fabrication should reach the tolerance typically of at least 0.1-0.01 mm but at a acceptable cost. Besides the materials and fabrication process, the design also affects the key issues like loss and cost. Using substrate-integration technology, the antennas will be fabricated onto any circuit boards such as printed circuit board, low-temperature co-fired ceramic (LTCC), and semiconductor substrate to reduce cost, size, transmission loss and enhance integration into circuits.

This talk will brief the design challenges in mmW antenna design and substrate-integration technology first. After that, recently developed substrate-integrated high gain antenna arrays for 60 and 140 GHz applications are exemplified with the introduction of the latest built measurement system up to 325 GHz. Last, the comments on the development of substrate-integration technology in antenna design at mmW and submmW bands are provided.

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The author would like to thank his team for their excellent work in this field in the past years, who are Drs Xianming Qing, Siew Bee Yeap, Junfeng Xu, Mei Sun, Yue Li, and Yan Zhang, Ke Gong, Wei Hong, and Zhenhe Feng.

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Zhi Ning Chen received his B.Eng, M.Eng, and PhD degrees all in Electrical Engineering from the Institute of Communications Engineering (ICE), China and his second PhD degree from University of Tsukuba, Japan, respectively. During 1988-1995, he worked at ICE as a faculty and PDF at Southeast University, China. During 1995-1997, Professor Chen joined the City University of Hong Kong as a Researcher. In 1997, he was awarded the JSPS Fellowship to work at University of Tsukuba, Japan. In 2004, he worked at IBM T. J. Watson Research Center, USA as an Academic Visitor. During 1999-2012, he worked with the Institute for Infocomm Research as a scientist and Head of RF & Optical Department. In 2012, he joined National University of Singapore as a Professor with a joint appointment of Advisor at I^2R .

Professor Chen has been the founding General Chairs of International Workshop on Antenna Technology (iWAT), International Symposium on InfoComm & Media Technology in Bio-Medical & Healthcare Applications (IS 3T-in-3A), International Microwave Forum (IMWF) as well as Asia-Pacific Conference on Antennas and Propagation (APCAP).

Professor Chen's current research interest includes engineering electromagnetics, antennas for microwaves, mmW, submmW, and THz systems. He has published 380 technical papers, authored/edited the four books, and is holding 30 granted and filed patents. He is the recipients of several international best paper awards.

Professor Chen is a Fellow of the IEEE *for the contribution to small and broadband antennas for wireless applications*. He is serving IEEE Trans Antennas and Propagation as an Associate Editor and served IEEE Antennas and Propagation Society as a Distinguished Lecturer.

Room B, 2nd Floor

Reflect array Technology: From Fundamentals to Recent Advances

Chair: Prof. Fan Yang

Tsinghua University

1. **Non Conventional Re-Radiating Elements for Broad-Band Reflectarrays**
   Paola Pirinoli
   Politecnico di Torino, Italy.

2. **Tunable Reflectarray Antennas: ADynamic Approach for Wireless Communications**
   Muhammad Yusof Ismail
   Universiti Tun Hussein Onn Malaysia, Malaysia.

3. **Integration Design of High Efficiency Reflectarray for Millimeter Wave Wireless** Communications
   Yan Zhang and Wei Hong
   Southeast University, China.

4. **Reflectarray Antenna: Theory, Designs, and Applications**
   Fan Yang
   Tsinghua University, China.

Non conventional re-radiating elements for broad-band Reflectarrays (Invited)

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SUMMARY

Printed reflectarrays (RAs) are nowadays a well established technology, with interesting electrical and mechanical features, virtually suitable for a wide range of applications. Nevertheless, printed reflectarrays also suffer for some drawbacks, that limit their use especially in those applications where requirements such as large bandwidth, multi-band operability and possibility of beam steering have to be satisfied.

For what concerns the bandwidth, it is essentially limited by two different reasons: the intrinsically poor bandwidth of printed radiating elements, usually no larger than the 3-6%, and the frequency dependence of the phase delay of the incident field. In particular this second aspect is quite critical and becomes dominant in large RAs [1], [2], since it requires that the RA elements should be able to compensate different phase delays at different operating frequencies. The most commonly solutions adopted for solving this problem generally result in quite complex, multi-layer re-radiating structures [3]-[5]). Recently, alternative solutions have been proposed, in which the RA elements are single-layer printed patches of non conventional shape [6]-[16], that present more degrees of freedom and therefore are potentially able to compensate also the frequency variation of the phase, allowing the bandwidth enhancement.

In this context, a possible solution is that of using a RA unit cell consisting in two or more radiating elements, resonating at different frequencies: in such a way, the range of variation of the phase for the unit cell reflection coefficient increases and therefore the enhancement of the RA bandwidth is obtained. Particularly suitable for this purpose are square, circular or elliptical rings [8], [9] that could be easily combined together obtaining a compact unit cell and present the further advantage of having a reduced resonant size with respect to other more conventionally shaped patches. The results reported in [9] show that, among the different analyzed configurations, the most promising ones seemed to be those consisting in two concentric square rings, or in a combination of an outer circular ring and an inner square one. Using these two possible type of unit cells, reduced size RAs have been designed, manufactured and tested. While the results reported in [12] show that the two concentric square rings provide a bandwidth of about the 11%, the use of the combination of the circular and square rings allows the design of a medium-size off-set RA with a measured bandwidth of the 19%, as appears from Fig. 1, in which the variation of the measured gain with the frequency has been plotted.

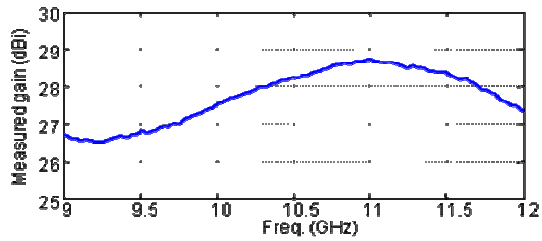

Figure 1. Frequency variation of the measured gain for an off-set RA with re-radiating elements consisting in the combination of concentric circular and square rings

A further enhancement of the bandwidth could be reached, still in the multi-resonant unit cells context, varying two or more geometrical parameters independently, in order to compensate both the reflection coefficient spatial phase delay and its frequency variation, and a proper RA design procedure [14]-[16]. In [15], two concentric square rings have been still used as re-radiating elements, but varying the size of the outermost ring and the ratio between the sides of the two rings independently: in this way it was possible to design a $19\lambda \times 19\lambda$ off-set reflectarray with a gain variation lower than 1 dB within the entire considered frequency range ([10.75-12.75] GHz); similar results have been obtained using modified Malta cross re-radiating elements [14], that have been used for the design of an off-set RA with double polarization, bandwidth greater than 19% and efficiency of the 62%.

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The results presented here are the outcomes of the work carried out in the past years by the antenna research group of the Politecnico di Torino, and particularly by Prof. Orefice, Ing Dassano and the author, by Prof. Zich and Dr. Mussetta, from Politecnico di Milano and by Prof. Freni from University of Florence.

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Paola Pirinoli received the M.S. (Laurea) and Ph.D. (Dottorato di Ricerca) degrees in electronic engineering, from the Politecnico di Torino, Italy, in 1989 and 1993, respectively. In October 1994, she joined the Politecnico di Torino as an Assistant Professor (Ricercatore) in the current Department of Electronics and Telecommunications, where she presently is Associate Professor. From November 1996 to February 1997 she was a Visiting Research Fellow at University of Nice - Sophia Antipolis (F).

Her main research activities include the development of analytically based numerical techniques, essentially devoted to the fast analysis of printed structures on planar or curved substrates, the modeling of non conventional substrates, the design and analysis of antennas for wireless communications, the design of printed reflectarrays with enhanced properties. She is the co-holder of a patent on a new, non conventional printed element for single layer broad band reflectarrays.

Dr. Pirinoli received a URSI Young Scientist Award, the "Barzilai" prize for the best paper at the National Italian Conference of Electromagnetics in 1998, and was the recipient of the prize for the best oral paper on antennas at the Millennium Conference on Antennas and Propagation in 2000.

Tunable Reflectarray Antennas: A Dynamic Approach for Wireless Communications (Invited)

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Abstract of the talk

For wireless communications, the antenna beam shape must be designed to satisfy the system level requirements. For example radar acquisition systems often require the generation of multiple reconfigurable beams which must be steered rapidly within the scan volume. Mechanical systems rely on gimbals and gear arrangements of conventional parabolic reflectors to physically rotate the antenna. However the systems are slow,gravity sensitive and susceptible to mechanical failure. A better option is to employelectronic scanning because of faster beam steering and since no moving parts required,this is a more robust method for obtaining the required coverage. Low profile waveguideand printed phased array antenna are well understood, however the devices are less welldeveloped because of the low switching, cost, weight and power consumptionsimultaneously. For example ferrite phase shifters are generally large and require highvoltages, whereas semiconductor devices are expensive, and at very high frequenciesthese are noisy, difficult to impedance match and have narrow bandwidth and very lowefficiency. Therefore for applications at higher frequencies, mechanical scanning is theonly option available to obtain beam shaping. In recent years, there has been interest in developing tunable microwave components using non-linear dielectrics, mainly ferroelectrics and anisotropic materials. These can be integrated into single substrates thus combining the key benefits of full integration, low weight and cost with continuous phase control. In this talk, important highlights on an alternative novel solution of creating a new integrated phase control strategy of reconfigurable reflectarray antennas by exploiting the anisotropic property of non-linear dielectrics and strategic slot element configurations for reconfigurable antenna pattern shaping is presented. Since the dielectric constant and hence the phase properties of many of these materials is controlled by a small bias voltage, a further benefit of electronic adjustment can be made for age and environmental compensations. Furthermore a mathematical model has been developed to establish a technique for a progressive phase distribution across the periodic structure of reflectarray antennas. Moreover, the RCS of the reflectarray can be dynamically controlled to reduce the RCS signature of the antenna.

Biography of the Speaker

Name: Muhammad Yusof Ismail, Ph.D.

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Dr. Muhammad Yusof Ismail received his Bachelor of Electrical and Electronics Engineering (Hons.) from Universiti Kebangsaan Malaysia in 2002. He worked as a communication engineer and as an academician in an engineering firm and Universiti Tenaga Nasional in Kuala Lumpur respectively before he furthered his doctoral program in the field of Satellite Communications. He completed his Doctor of Philosophy in Communications Engineering in 2007 from Queen's University of Belfast, United Kingdom. Dr Muhammad Yusof, who is currently a Senior Lecturer at Department of Communications Engineering, Universiti Tun Hussein Onn Malaysia (UTHM), Johor had been appointed as Deputy Dean (Research) in 2010 at the Office of Research, Innovation, Commercialization and Consultancy, UTHM. Dr. Muhammad Yusof currently heads Wireless and Radio Science Centre (WARAS) which is one of active research centres in UTHM. His research interests include design of active and passive planar antennas, microwave absorbers and frequency selective surfaces. Dr. Muhammad Yusof who is also an editor of International Journal of Integrated Engineering has published more than 70 articles including a manuscript book in high impact factor journals and indexed conferences. Based on several completed projects, he has successfully filed four patents on reflectarray antennas and microwave absorbers. He had been invited to give talks and keynote sessions at various national and international conferences in which he also received numerous research awards for best papers and best innovative research products at national and international levels. His name was also mentioned in the magazine "Marquis Who is Who in the World" edition 2011 issue of USA. Based on his research performance, he was awarded “Best Fundamental Research Grant Scheme Project Award” and was successful in securing a grant from Prototype Research Grant Scheme (PRGS) by the Ministry of Higher Education of Malaysia in 2011 and 2012 respectively.

Integration Design of High Efficiency Reflectarray for Millimeter Wave Wireless Communications （Invited）

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SUMMARY

High gain, high efficiency antenna design is a challenge for millimeter-wave (mmW) long range wireless communication [1]. As is well known, the conductor loss and radiation loss are increased evidently with the operating frequency goes up. Thus, the conventional antenna array, comprising of many low-gain elements, usually suffer from severe loss due to its essentially complicated feeding network [2]. The reflectarray [3-6], inspired by conventional parabolic reflector antenna, is more preferred as an effective solution for implementing high gain antennas in mmW bands because of its air feed scheme.

In general, reflectarray is composed of a planar reflector and a primary source [3], i.e., horns or open waveguides. However, these used primary sources always have bulk sizes, and a transition between the antenna and planar circuits is necessary. Again, the transition will introduce additional insertion loss to the entire system, and cause an integration issue. To alleviate these problems, an integrated approach of the reflectarray and a planar primary source is proposed [6], and the used feed source is a substrate integrated waveguide antenna array [7], which ensures that the proposed reflectarray possesses the capbility of directly integration with mmW plananr circuits.

This talk will introduce the concept of reflectarray with integrated planar feed first. Then, the analysis of loss for the proposed antenna will be elaborated. Next, design considerations will be provided according to the loss factors for achieving high efficiency. Prototype in mmW bands will be presented for verification, and finally a conclusion will be drawn.

ACKNOWLEDGMENTS

The authors would like to thank their team for the contribution in this field in the past years, who are Miss Mei Jiang, Mr. Abd Elhandy, Mr. Shunhua Yu, Dr. Raj. Mittra, Dr. Haiming Wang, and Dr. Jixin Chen.

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During Jan. 2009 to July 2009, he was with the Institute for Infocomm Research (I2R), Agency for Science, Technology, and Research (A*STAR), Singapore, as a research engineer. From Nov. 2009 to Dec. 2010, he was with the Electromagnetic Communication Laboratory of the Pennsylvania State University as a visiting scholar. Since Dec. 2011, he has been a lecture with the State Key Laboratory of Millimeter Waves, SEU.

His research interests include millimeter wave and terahertz antennas, planar transmission line techniques and filters, RF and antenna design for satellite communication.

He has published over a dozens of peer-viewed papers, and is holding 14 granted and filed patents. He is the recipient of best student paper award of the international conference on microwave and millimeter wave technology (2008). He serves as a reviewer for several journals, including IEEE Trans Antennas and Propagation, PIER, etc. He was a TPC member of 2013 IEEE MTT-S International Wireless Symposium.

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Reflectarray Antenna: Theory, Designs, and Applications
(Invited)

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Beijing, China

Abstract:

As a new generation of high gain antenna, reflectarray antenna attracts growing interests in the last decade. Compared to conventional parabolic reflectors or phased arrays, the reflectarray antenna has a number of advantages, such as conformal geometry, low cost, light weight, high efficiency, easy integration with RF circuitry, and wide beam scanning capability. As a consequence, they have great potential in a wide range of applications, including radar, remote sensing, wireless communications, spatial power combining, and THz images and sensors. This talk will present an overview on our recent developments on reflectarray antennas, including the analysis and synthesis methods of reflectarrays, wideband and multi-band reflectarray designs, multi-beam and beam scanning reflectarrays. The presentation will also discuss several challenging topics in this area, with the hope to inspire and promote reflectarray research for future applications.

Bio:

Fan Yang received the B.S. and M.S. degrees from Tsinghua University, and the Ph.D. degree from University of California, Los Angeles (UCLA). Currently, he is a Professor at Tsinghua University, and serves as the Director of the Microwave and Antenna Institute. Dr. Yang's research interests include antenna theory, designs, and measurements, novel electromagnetic materials, structures and their applications, computational electromagnetics and optimization techniques, and applied electromagnetic systems. He has published three books, five book chapters, and over 200 journal articles and conference papers. Dr. Yang is a Senior Member of IEEE and a Full Member of URSI/USNC. He serves as an Associate Editor for *IEEE Trans. Antennas Propagation* and Associate Editor-in-Chief for *Applied Computational Electromagnetics Society Journal*.

Keynote Speech

October 23 (WED) Room F, 2nd Floor

10:00-10:40

A teleco's view for better and better customer expectations in multi-band, multi-network, multi-device and multi-demand smart society

Dr. Shinichi Nomoto

KDDI R&D Laboratories Inc.

10:40-11:20

4G/Multiband Handheld Device Antennas and Their Antenna Systems

Kin-Lu Wong, Professor

National Sun Yat-sen University

11:20-12:00

Rethinking the Wireless Channel for OTA testing and Network Optimization by Including User Statistics: RIMP, Pure-LOS, Throughput and Detection Probability

Per-Simon Kildal, Professor

Chalmers University of Technology

A teleco's view for better and better customer expectations in multi-band, multi-network, multi-device and multi-demand smart society

Shinichi Nomoto, Ph.D
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Abstract:
Since people use smart phones in daily life, the mobile traffic over the network is changing. The rich content such as video streaming with high quality becomes popular and popular, resulting in huge traffic. The 4G (LTE) system with high capacity, launched in 2012 and now under rapid deployment, may not be sufficient to cope with the explosion. KDDI, the second-largest telco in Japan, is accelerating R&D activities towards LTE-Advanced, including Multi-User MIMO, Small Cell Enhancement, and Small-sized Active Antenna for Multi-band Basestations. Also, KDDI has a broader view under the name of "3M strategy" which comprises "Multi- Network", "Multi-Device" and "Multi-Use." We believe that further network enhancement from "Dumb Pipe" to "Smart Pipe" is the key for user-centric smarter life. Related R&D activities backed by Big Data will be introduced.

Biography

Shinichi NOMOTO received B.E., M.E., and Ph.D degrees, all in electrical engineering, from Waseda University, Tokyo, Japan, in 1980, 1982, and 1993, respectively. He joined Kokusai Denshin Denwa Co., Ltd. (now KDDI Corp.), in 1982. Since 1983, he has been engaged in research and development of radio transmission systems. As a professional assignee at Inmarsat HQ's from 1992 to 1995, he has contributed to the "Inmarsat-P (ICO)" project, which includes development of a global personal communications system using a number of non-geostationary satellites.

He is a Vice President, Managing Director, of KDDI R&D Laboratories, Inc., an R&D fellow of KDDI, a fellow of IEICE, a senior member of IEEE, and a Chairman of the Standardization Council in the Telecommunication Technology Committee (TTC). He has also been a visiting professor of Waseda University, Tokyo University of Agriculture and Technology, University of Electro-Communications, Tokyo Institute of Technology, Keio University, and Doshisha University. He received the Shinohara Memorial Young Researchers' Award from IEICE in 1988, the Piero Fanti International Prize from INTELSAT/Telespazio in 1988, and the Radio Distinguished Award from RCR (now ARIB) in 1991. In 2004, two of his published papers received the Best Paper Awards from IEICE, one of which was the recipient of the 10th Inose Award (the very best paper of the year) too. In 2010, he received the Prize for Science and Technology (Development Category) in the Commendation for Science and Technology by the Minister of Education, Culture, Sports, Science and Technology. He also received the 58th Maejima Hisoka Prize from Tsushinbunka Association in 2013.

4G/Multiband Handheld Device Antennas and Their Antenna Systems

Kin-Lu Wong
Department of Electrical Engineering
National Sun Yat-sen University, Kaohsiung, Taiwan
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Abstract
Promising 4G/multiband antennas for handheld devices will be presented. Some low-profile, small-size and wideband techniques for LTE/WWAN antennas will be addressed. The ground antenna design concept and promising ground antenna structure will be introduced, which is especially suitable for slim, flexible handheld devices. The promising antenna systems using the same for achieving wideband high-isolation antenna systems for MIMO, diversity or dual WWAN operation will be discussed.

Future trends for the handheld device antennas including the reconfigurable and tunable antennas that can be adaptive to environmental changes or tunable to cover different bands or switched to have multi-beams or suitable for antenna systems will also be discussed.

Biography

Prof. Kin-Lu Wong is Sun Yat-sen Chair Professor of National Sun Yat-sen University, Kaohsiung, Taiwan. He has published more than 500 refereed journal papers and 250 conference articles. He holds over 200 patents and is the author of three books including Compact and Broadband Microstrip Antennas (Wiley, 2002) and Planar Antennas for Wireless Communications (Wiley, 2003). Dr. Wong's published works have been cited over 14,000 times in Google Scholar.

Dr. Wong is an IEEE Fellow and received many awards including NSC (National Science Council) Outstanding Distinguished Researcher in 2013, top 50 NSC scientific achievements in past 50 years (1959~2009) in Taiwan, and the Academic Award from Ministry of Education of Taiwan, in 2012. He was selected as top 100 honor of Taiwan by Global Views Monthly in August 2010 for his contribution in mobile antenna researches. Dr. Wong received the 2008 APMC Best Paper Award (APMC Prize), and is an IEEE AP-S Awards Committee member (2011~2013). Dr. Wong was General Chair of 2012 APMC and will also serve as General Chair of 2014 ISAP at Kaohsiung, Taiwan.

Rethinking the Wireless Channel for OTA testing and Network Optimization by Including User Statistics: RIMP, Pure-LOS, Throughput and Detection Probability

Per-Simon Kildal, Professor
Chalmers University of Technology

Abstract
The reverberation chamber has through the last thirteen years been used to emulate a rich isotropic multipath (RIMP) environment, and it has successfully been demonstrated that it can be used to test performance of multiport antennas and complete wireless terminals with MIMO and OFDM. The measured throughputs of practical LTE devices have been shown to be in excellent agreement with basic theoretical algorithms.
Now is the time to use this concept and complete the picture so that also real-life environments can be covered. This is done by introducing the pure-LOS as another limiting environment, and by introducing the statistics of the user. The latter plays a major role in pure-LOS that thereby becomes a random-LOS. The two limit-environments are linked together with a real-life hypothesis, and work has started to test this by simulations.
It will be shown that the major characterizing quantity becomes the detection probability of the single or multiple bit streams (for diversity and multiplexing cases, respectively) over an ensemble of users. This detection probability becomes equal to throughput in a multipath environment, readily seen through a simple threshold receiver model representing an ideal digital receiver.
The new approach represents a way to start optimizing the wireless networks by taking the statistics of the user into account.

Biography

Professor Per-Simon Kildal, Distinguished Lecturer of IEEE Antennas and Propagation Society 2011-2013
Per-Simon Kildal is professor in antennas at Chalmers University of Technology in Gothenburg, Sweden since 1989. He is teaching antennas and heading a group doing research on antenna systems. Until now, 19 persons have received a Ph.D. from him.
Kildal received two doctoral degrees from the Norwegian Institute of Technology in Trondheim. He is a Fellow of IEEE since 1995, and in 2011 he was awarded the prestigious Distinguished Achievements Award from the IEEE Antennas and Propagation Society. Kildal has authored more than 120 articles in scientific journals; concerning antenna theory, analysis, design and measurements, two of which was awarded best paper awards by IEEE (1985 R.W.P. King Award and 1991 Schelkunoff Prize Paper Award).
Kildal's research is innovative and industrially oriented, and has resulted in several patents and related spinoff companies. He has done the electrical design of the 40m x 120 m cylindrical reflector antenna and line feed of the EISCAT scientific organization, and the dual-reflector Gregorian feed of the 300 m Ø radio telescope in Arecibo. He is the inventor

behind technologies such as dipole with beam forming ring, the hat antenna, and the eleven feed. Kildal's hat-fed reflectors have till now been manufactured in more than 930 000 copies for use in radio links.

Kildal was the first to introduce the reverberation chamber as an accurate measurement instrument for Over-The-Air (OTA) characterization of small antennas and wireless terminals for use in multipath environments with fading, commercialized in Bluetest AB.

Kildal is also the originator of the concept of soft and hard surfaces from 1988, today being regarded as the first metamaterials concept. This concept is the basis of his newest and most fundamental invention, the gap waveguide technology.

Kildal organizes and lectures in courses within the European School of Antenna (ESoA, www.antennasvce.org). His textbook Foundations of Antennas - A Unified Approach (Lund, Sweden: Studentlitteratur, 2000) was well received, and is now in the process of being revised.

Session List

October 23 (WED) ~ October 25 (FRI)

2013-10-23 PM

Room A

ORAL Session: WP-1(A)

Adv Ant for Radio-Astr. -1

Session Chair: Jian Yang, Bo Peng

13:30 - 13:50	Design of Antenna Array for the L-band Phased Array Feed for FAST (Invited Paper) *Yang Wu, Xiaoyi Zhang, Biao Du, Chengjin Jin, Limin Zhang, Kai Zhu* (China)	**11**
13:50 - 14:10	Progress in SHAO 65m Radio Telescope Antenna (Invited Paper) *Biao Du, Yuanpeng Zheng, Yifan Zhang, Wancai Zhang, Zhiqiang Shen, Qingyuan Fan, Qinghui Liu, Quanbao Ling* (China)	**14**
14:10 - 14:30	Promoting the Planetary Radio Science in the Lunar and Deep Space Explorations of China *Jinsong Ping* (China)	**17**
14:30 - 14:50	Initial Considerations of the 5 Meter Dome A Terahertz Explorer (DATE5) for Antarctica *Ji Yang, Zheng Lou, Yingxi Zuo, Jingquan Cheng* (China)	**21**
14:50 - 15:10	Design Study on Near-Field Radio Holography of the 5-Meter Dome A Terahertz Explorer *Ying-Xi Zuo, Zheng Lou, Ji Yang, Jingquan Cheng* (China)	**25**

ORAL Session: WP-2(A)

Adv Ant for Radio-Astr. -2

Session Chair: Biao Du, Jian Yang

16:00 - 16:20	Calculation of the Phase Center of an Ultra-wideband Feed for Reflector Antennas (Invited Paper) *Jian Yang* (Sweden)	**30**
16:20 - 16:40	Dish Verification Antenna China for SKA (Invited Paper) *Xiaoming Chai, Biao Du, Yuanpeng Zheng, Lanchuan Zhou, Xiang Zhang, Bo Peng* (China)	**33**
16:40 - 17:00	Telescopes for IPS Observations (Invited Paper) *Li-Jia Liu, Lan-Chuan Zhou, Bin Liu, Cheng-Jin Jin, Bo Peng* (China)	**37**
17:00 - 17:20	Design of a 4.5m polar axis Antenna for CSRH *Chuanfeng Niu, Jingchao Geng, Yihua Yan, Guodong Yang, Donghe Zhao, Chao Liu, Zhijun Chen, Biao Du, Yang Wu* (China)	**41**
17:20 - 17:40	The optics of the Five-hundred-meter Aperture Spherical radio Telescope *Chengjin Jin, Kai Zhu, Jin Fan, Hongfei Liu, Yan Zhu, Hengqian Gan, Jinglong Yu, Zhisheng Gao, Yang Cao, Yang Wu* (China)	**44**

2013-10-23 PM
Room B

ORAL Session: WP-1(B)
New Strategies of CEM-1
Session Chair: Chao-Fu Wang, Haogang Wang

13:30 - 13:50	A General MoM-PO Hybrid Framework for Modelling Complex Antenna Arrays Mounted on Extremely Large Platform (Invited Paper) *Zi-Liang Liu, Xing Wang, Chao-Fu Wang* (Singapore)	**48**
13:50 - 14:10	An Adaptive Frequency Sweeping Algorithm of MoM Impedance Matrices in Full-Wave Analysis of Microstrip Patch Antennas *Shifei Wu, Zhe Song, Weidong Li* (China)	**52**
14:10 - 14:30	Combination of Ultra-Wide Band Characteristic Basis Function Method and Improved Adaptive Model-Based Parameter Estimation in MoM Solution *A-Min Yao, Wen Wu, Jun Hu, Da-Gang Fang* (China)	**55**
14:30 - 14:50	Analysis of Millimeter-Wave Exposure on Rabbit Eye Using a Hybrid PMCHWT-MoM-FDTD Method *Jerdvisanop Chakarothai, Yukihisa Suzuki, Masao Taki, Kanako Wake, Kensuke Sasaki, Soichi Watanabe, Masami Kojima* (Japan)	**59**
14:50 - 15:10	Time Domain Integral Equation Method Using FFT-Based Marching-On-in-Degree Method for Analyzing PEC Patches On Substrate *Jian Yao Zhao, Wei Luo, Wen Yan Yin* (China)	**63**

ORAL Session: WP-2(B)
New Strategies of CEM-2
Session Chair: Wen-Yan Yin, Lianyou Sun

16:00 - 16:20	Node-Based Meshless Methods: A Way of Generalizing Numerical Modeling Techniques (Invited Paper) *Zhizhang Chen* (China)	**67**
16:20 - 16:40	From Antenna Design to Feeding Design: A Review of Characteristic Modes for Radiation Problems (Invited Paper) *Yikai Chen, Chao-Fu Wang* (Singapore)	**68**
16:40 - 17:00	Parallel Higher-Order DG-FETD Simulation of Antennas (Invited Paper) *Fu-Gang Hu, Chao-Fu Wang* (Singapore)	**71**
17:00 - 17:20	A Hybridization of Multi-Level UV with the Hierarchical Fast Far Field Approximations for 3D Rough Surface Scattering (Invited Paper) *Haogang Wang, Biao Wang, Tien-Hao Liao, Leung Tsang* (China)	**73**
17:20 - 17:40	Analysis of Electromagnetic Scattering from Complicated Objects Using Nonconformal IE-DDM (Invited Paper) *Xiang Wei, Jun Hu, Mi Tian, Ran Zhao, Ming Jiang, Zaiping Nie* (China)	**76**
17:40 - 18:00	Validation of FETI-2LM formulation for EBG material prediction and optimal strategy for multiple RHS *André Barka, François-Xavier Roux* (France)	**80**

2013-10-23 PM
Room C

ORAL Session: WP-1(C)
UWB Antennas
Session Chair: Zhongxiang Shen, Qiang Chen

13:30 - 13:50	Low VSWR High Efficiency Ultra-Wideband Antenna for Wireless Systems Applications *Na Li, Haili Zhang, Yi Jiang* (China)	**85**
13:50 - 14:10	Printed Slot Antenna for WLAN/WiMAX and UWB Applications *Pichet Moeikham, Prayoot Akkaraekthalin* (Thailand)	**88**
14:10 - 14:30	A Compact Lower UWB Band PIFA for BAN Applications *XiongYing Liu, Chunping Deng, YuHao Fu* (China)	**92**
14:30 - 14:50	A TE-shaped Monopole Antenna with Semicircle Etching Technique on ground plane for UWB Applications *Amnoiy Ruengwaree, Watcharaphon Naktong, Apirada Namsang* (Thailand)	**95**
14:50 - 15:10	Design and Analysis of a Modified Sierpinski Carpet Fractal Antenna for UWB Applications *Bin Shi, Zhiming Long, Jili Wang, Lixia Yang* (China)	**99**

ORAL Session: WP-2(C)
Broadband Antennas
Session Chair: Derek Gray, Jin Shi

16:00 - 16:20	Broadband Loaded Cylindrical Monopole Antenna *Solenne Boucher, Ala Sharaiha, Patrick Potier* (France)	**104**
16:20 - 16:40	Wideband frangible monopole for radio monitoring *Derek Gray* (China)	**107**
16:40 - 17:00	Hybrid Antenna Suitable for Broadband Mobile Phone MIMO System *Minkil Park, Theho Son, Youngmin Jo* (South Korea)	**111**
17:00 - 17:20	Design of a High-Gain Wideband Microstrip antenna with a Stepped Slot Structure *Weigang Zhu, Tongbing Yu, Weimin Ni* (China)	**115**
17:20 - 17:40	A Q-Band Dual-Mode Cavity-Backed Wideband Patch Antenna with Independently Controllable Resonances *Tao Zhang, Yan Zhang, Shunhua Yu, Wei Hong, Ke Wu* (China)	**118**

2013-10-23 PM
Room D

ORAL Session: WP-1(D)
Compact Antennas
Session Chair: Kin-Lu Wong, Yuehe Ge

13:30 - 13:50	Compact Hybrid Dielectric Resonator with Patch Antenna Operating at Ultra-high Frequency Band *Muhammad Ishak Abdul Sukur, Mohamad Kamal A Rahim, Noor Asniza Murad* (Malaysia)	**123**
13:50 - 14:10	A UHF Band Compact Conformal PIFA Array *Hao Wang, Jing Zhou, Kang Chen, Yong Huang, Jie Wang, Xiaoqi Zhu* (China)	**127**
14:10 - 14:30	Small-Size Printed Antenna with Shaped Circuit Board for Slim LTE/WWAN Smartphone Application *Hsuan-Jui Chang, Kin-Lu Wong, Fang-Hsien Chu, Wei-Yu Li* (Taiwan)	**131**
14:30 - 14:50	Compact and Planar Near-field and Far-field Reader Antenna for Handset *Wenjing Li, Yuan Yao, Junsheng Yu, Xiaodong Chen* (China)	**133**
14:50 - 15:10	Printed Loop Antenna with an Inductively Coupled Branch Strip for Small-Size LTE/WWAN Tablet Computer Antenna *Meng-Ting Chen, Kin-Lu Wong* (Taiwan)	**136**

ORAL Session: WP-2(D)
Small Antennas
Session Chair: Seong-Ook Park, Wen-Shan Chen

16:00 - 16:20	An idea for low-profile unidirectional slot antennas based on its complementary dipoles *Jiang Xiong, Xuelian Li, Bing-Zhong Wang* (China)	**139**
16:20 - 16:40	A New Radiation Method for Ground Radiation Antenna *Hongkoo Lee, Jongin Ryu, Jaeseok Lee, Hyunghoon Kim, Hyeongdong Kim* (South Korea)	**143**
16:40 - 17:00	Design of A Novel Quad-band Circularly Polarized Handset Antenna *Youbo Zhang, Yuan Yao, Junsheng Yu, Xiaodong Chen, Yixing Zeng, Naixiao He* (China)	**146**
17:00 - 17:20	Mobile handset antenna with parallel resonance feed structures for wide impedance bandwidth *Yongjun Jo, Kyungnam Park, Jaeseok Lee, Hyunghoon Kim, Hyeongdong Kim* (South Korea)	**149**
17:20 - 17:40	Dual Beam Antenna for 6-Sector Cellular System *Yoshihiro Kozuki, Hiroyuki Arai, Huiling Jiang, Taisuke Ihara* (Japan)	**151**

2013-10-23 PM
Room E

15:10 - 16:00 **POSTER Session: WP-C**

Best Student Papers Contest

P.1	A Method of Moments Analysis and Design of RLSA by Using Only a Dominant Mode Basic Function and Correction Length for Slots *Tung XuanNguyen, Jiro Hirokawa, Makoto Ando, Osamu Amano, Takaomi Matsuzaki, Shuichi Koreeda, Kesato Takahashi* (Japan)	**156**
P.2	A Compact and Low-profile Antenna with Stacked Shorted Patch Based on LTCC Technology *Yongjiu Li, Xiwang Dai, Cheng Zhu, Gang Dong, Chunsheng Zhao, Long Li* (China)	**160**
P.3	An Investigation on the Gain of Folded Reflectarray Antennas with Different F/Ds *Mei Jiang, Yan Zhang, Wei Hong, Shunhua Yu* (China)	**164**
P.4	Planar Multi-band Monopole Antenna for WWAN/LTE Operation in a Mobile Device *Jia-Ling Guo, Hai-Ming Chin, Jui-Han Lu* (Taiwan)	**168**
P.5	Development of Rotating Antenna Array for UWB Imaging Application *Min Zhou, Xiaodong Chen, Clive Parini* (United Kingdom)	**172**
P.6	A Singular Value Decomposition Model for MIMO Channels at 2.6GHz *Yang Liu, Ye Wang, Wen junLu, Hong boZhu* (China)	**176**
P.7	An Efficient 3D DI-FDTD Method for Anisotropic Magnetized Plasma Medium *Ye Zhou, Yi Wang, Min Zhu, Qunsheng Cao* (China)	**180**
P.8	Design Principles and Applications of a novel Electromagnetic Spectrum Table *Min Ju, Shi-Lin Xiao* (China)	**184**
P.9	An Integrated Transition of Microstrip to Substrate Integrated Nonradiative Dielectric Waveguide Based on Printed Circuit Boards *Fan Li, Feng Xu* (China)	**188**
P.10	FE-BI-MLFMA Combined with FETI for Accurate and Fast Computation of Scattering by Large-Scale Finite Array Structure *Li Gong, Hong-Wei Gao, Ming-Lin Yang, Xin-qing Sheng* (China)	**192**
P.11	A Two-Level Spectral Preconditioning for the Finite Element Method *Zi He, Weiying Ding, Ningye He, Rushan Chen* (China)	**196**
P.12	Preliminary Study of a Ground Penetrating Radar for Subsurface Sounding of Solid Bodies in the Solar System *Takahiro Ito, Raita Katayama, Takeshi Manabe, Toshiyuki Nishibori, Junichi Haruyama, Takehiro Matsumoto, Hideaki Miyamoto* (Japan)	**200**
P.13	A 14 GHz Non-Contact Radar System for Long Range Heart Rate Detection *Jee-Hoon Lee, Seongook Park* (South Korea)	**204**
P.14	Interference detection for other systems using MIMO-OFDM signals *Ryochi Kataoka, Kentaro Nishimori, Masaaki Kawahara, Takefumi Hiraguri, Hideo Makino* (Japan)	**207**
P.15	Experimental Study on Statistical Characteristic of MIMO Sensor for Event Detection *Shinji Itabashi, Hiroyoshi Ymamada, Kentaro Nishimori, Yoshio Yamaguchi* (Japan)	**211**

2013-10-23 PM
Room E

15:10 - 16:00	**POSTER Session: WP-P**	
P.19	The Design and Simulation of Feederlines of Log-periodic Dipole Antenna in Microwave Band *Yajuan Shi, Dongan Song, Dinge Wen, Hailiang Xiong, Qi Zhang, Mingliang Huang* (China)	**216**
P.20	A Novel Active Element Pattern Method for Calculation of Large Linear arrays *Shuai Zhang, Shuxi Gong, Huan Hu* (China)	**220**
P.21	Design and Research on the Plasma Yagi Antenna *Huichao Zhao, Shaobin Liu, Yuquan Li, Huan Yang, Beiyin Wang* (China)	**223**
P.22	A Compact Tri-Band Monopole Antenna for WLAN and WiMAX Applications *Guorong Zou, Helin Yang, Linyan Guo* (China)	**226**
P.23	Optimization Design of Matching Networks for High-frequency Antenna *Ying Suo, Fazong Li, Wei Li, Qun Wu* (China)	**229**
P.24	The Fast and Wideband MoM Based on GPU and Two-Path AFS Acceleration *Lan Li, Jun DongTan, Zhuo Su, Yunliang Long* (China)	**233**
P.25	Circularly Polarized DRA Mounted on or Embedded in Conformal Surface *Saber H.Zainud-Deen, Nohaa A.Elshalaby, Kamal H.Awadalla* (Egypt)	**237**
P.26	A High Isolation MIMO Antenna Used a Fractal EBG Structure *Haiming Wang, Dongya Shen, Teng Guo, Xiupu Zhang* (China)	**241**
P.27	Conformal microstrip circularly polarization antenna array *Xiao-Bo Xuan, Feng-Wei Yao, Xiao-qing Tian* (China)	**245**
P.28	Detect Phase Shifter Module of Array Antenna Using The Sun *Gang Quan, Wenzi Jiang, Peng Xu* (China)	**248**
P.29	The Numerical Simulation Studies of The Electromagnetic Wave Resistivity Logging-While-Drilling Instrument antennas Testing In The Calibrating Tank *Anzong Li, Jun Zhu, Tiantian Zhang, Guohua Yang* (China)	**252**
P.30	A phase-matching method for antenna phase center determination basing upon site insertion loss measurement in OATS *Zhenfei Song, Ming Xie, Fan Wu, Xiaoxun Gao, Weilong Wang* (China)	**255**
P.31	A Novel Method for Antenna Phase Center Calibration *Da Ma, Shanguo Yang, Yuqiang Wang, Wenrui Huang, Lingli Hou* (China)	**259**
P.32	Design of An Internal Penta-band Monopole Antenna for Mobile Handset *Naixiao He, Yuan Yao, Youbo Zhang, Junsheng Yu, Xiaodong Chen* (China)	**262**
P.33	Miniaturized High Gain Slot Antenna with Single-layer Director *Hongjuan Han, Ying Wang*, Xueguan Liu, Huiping Guo* (China)	**265**
P.34	A Frequency Reconfigurable Planar Inverted-F Antenna for Wireless Applications *Zheng Xiang, Haijing Zhou, Ju Feng, Cheng Liao* (China)	**269**
P.35	Novel Generalized Synthesis Method of Microwave Triplexer by Using Non-Resonating Nodes *Yongliang Zhang, Tao Su, Zhipeng Li, Changhong Liang* (China)	**273**
P.36	S-Band Circularly Polarized Crossed Dipole Antenna for Automotive Applications *Jui-Hung Chou, Ding-Bing Lin, Che-Hsu Lin, Hsueh-Jyh Li* (Taiwan)	**276**

2013-10-24 AM
Room A

ORAL Session: TA-1(A)
EurAAP/COST
Session Chair: Per-Simon Kildal

08:00 - 08:20	A General Technique for THz Modeling of Vertically Aligned CNT Arrays (Invited Paper) *Jiefu Zhang, Yang Hao* (United Kingdom)	**281**
08:20 - 08:40	Efficient numerically-assisted modelling of grounded arrays of printed patches (Invited Paper) *María García-Vigueras, Francisco Mesa, Francisco Medina, Raúl Rodríguez-Berral, Juan R. Mosig* (Switzerland)	**284**
08:40 - 09:00	Correlation Between Far-field Patterns on Both Sides of the Head of Two-port Antenna on Mobile Terminal (Invited Paper) *Ahmed Hussain, Per-Simon Kildal, Ulf Carlberg, Jan Carlsson* (Sweden)	**288**
09:00 - 09:20	Antenna Measurement Intercomparison Campaigns in the framework of the European Association of Antennas and Propagation (Invited Paper) *Lucia Scialacqua, F. Mioc, Jiaying Zhang, Lars Foged, M. Sierra-Castañer* (France)	**290**
09:20 - 09:40	Capacitively-Loaded THz Dipole Antenna Designs with High Directivity and High Aperture Efficiency (Invited Paper) *Ning Zhu, Richard WZiolkowski* (United States)	**294**

ORAL Session: TA-2(A)
Wireless Power Transmis.
Session Chair: Le-Wei Li, Qiang Chen

10:30 - 10:50	Theoretical Analysis, Design and Optimization of Printed Coils for Wireless Power Transmission (Invited Paper) *Jia-Qi Liu, Yi-Yao Hu, Yin Li, Le-Wei Li* (China)	**298**
10:50 - 11:10	Rectifier Conversion Efficiency Increase in Low Power Using Cascade Connection at X-band (Invited Paper) *JoonWoo Park, Youngsub Kim, Youngjoong Yoon, Jinwoo Shin, Joonho So* (South Korea)	**302**
11:10 - 11:30	Interference Reduction Method Using a Directional Coupler in a Duplex Wireless Power Transmission System *Kengo Nishimoto, Kenzaburo Hitomi, Takeshi Oshima, Toru Fukasawa, Hiroaki Miyashita, Yoshiyuki Takahashi, Yoshiyuki Akuzawa* (Japan)	**306**
11:30 - 11:50	A Hybrid Method on the Design of C Band Microwave Rectifiers *Chengyang Yu, Biao Zhang, Sheng Sun, Changjun Liu* (China)	**310**
11:50 - 12:10	Analysis of Near-Field Power Transfer of Multi-Antenna Using Multiport Scattering Parameters *Mingda Wu, Qiang Chen, Qiaowei Yuan* (Japan)	**313**

2013-10-24 AM
Room B

ORAL Session: TA-1(B)
Computational EM
Session Chair: André Barka, Yaming Bo

08:00 - 08:20	Fast Broad-band Angular Response Sweep Using FEM in Conjunction with Compressed Sensing Technique *Lu Huang, Bi-yi Wu, Xin-qing Sheng* (China)	**318**
08:20 - 08:40	Finite Macro-Element Method for Two-Dimensional Eigen-Value Problems *Huapeng Zhao, Zhongxiang Shen* (Singapore)	**322**
08:40 - 09:00	Accelerated Plasma Simulations using the FDTD Method and the CUDA Architecture *Wei Meng, Yufa Sun* (China)	**325**
09:00 - 09:20	A Near-Surface Interpolation Scheme Based on Radial Basis Function *Canlin Pan, Ming Zhang, Yaming Bo* (China)	**329**
09:20 - 09:40	1D Modified Unsplitted PML ABCs for truncating Anisotropic Medium *Zhichao Cai, Shuibo Wang, Haochuan Deng, Lixia Yang, Xiao Wei, Hongcheng Yin* (China)	**333**

ORAL Session: TA-2(B)
EM Scattering
Session Chair: Kiyotoshi Yasumoto, Zhenhai Shao

10:30 - 10:50	Enhancement of Near Fields Scattered by Metal-Coated Dielectric Nanocylinders *Pei-Wen Meng, Kiyotoshi Yasumoto, Yun-Fei Liu* (China)	**337**
10:50 - 11:10	Diffraction Components given by MER Line Integrals of Physical Optics across the Singularity on Reflection Shadow Boundary *Pengfei Lu, Makoto Ando* (Japan)	**341**
11:10 - 11:30	Near-Field Scattering Characters of the Ship *Chonghua Fang, Xuemei Huang, Qiong Huang, Hui Tan, Jing Xiao* (China)	**343**
11:30 - 11:50	Hybrid SPM to investigate scattered field from rough surface under tapered wave incidence *Qing Wang, Xiao-bang Xu, Zhenya Lei, Yongjun Xie* (China)	**347**
11:50 - 12:10	Study on the Optical Properties of Nanowires Using FDTD Method *Xiang Huang, Liang Yu, Jin-Yang Chu, Zhi-Xiang Huang, Xian-Liang Wu* (China)	**351**

2013-10-24 AM
Room C

ORAL Session: TA-1(C)
WLAN Antennas
Session Chair: Jui-Han Lu, Yuan Yao

08:00 - 08:20	A Compact Microstrip-Line-Fed Printed Parabolic Slot Antenna for WLAN Applications *Wanwisa Thaiwirot, Norakamon Wongsin* (Thailand)	**356**
08:20 - 08:40	Dual-band Circularly Polarized Monopole Antenna for WLAN Applications *Hao-Shiang Huang, Jui-Han Lu* (Taiwan)	**360**
08:40 - 09:00	Tapered Slot Antenna with Squared Cosine Profile for WLAN Applications *Yosita Chareonsiri, Wanwisa Thaiwirot, Prayoot Akkaraekthalin* (Thailand)	**363**
09:00 - 09:20	A Triple Band Arc-Shaped Slot Patch Antenna for UAV GPS/Wi-Fi Applications *Jianling Chen, Kin-Fai Tong, Junhong Wang* (China)	**367**
09:20 - 09:40	Dual-Band Printed L-Slot Antenna for 2.4/5 GHz WLAN Operation in the Laptop Computer *Saran Prasong, Rassamitut Pansomboon, Chuwong Phongcharoenpanich* (Thailand)	**371**

ORAL Session: TA-2(C)
Patch Antennas
Session Chair: Dhaval Pujara, Xinmi Yang

10:30 - 10:50	Analysis of L-Probe Fed-Patch Microstrip Antennas in a Multilayered Spherical Media *Tao Yu, Chengyou Yin* (China)	**376**
10:50 - 11:10	Research on Circularly Polarized Small Disk Coupled Square Ring Microstrip Antenna for GPS Application *Peng Cheng, Tongbin Yu, Hongbin LI, Wenquan Cao* (China)	**380**
11:10 - 11:30	A 35GHz Stacked Patch Antenna with Dual-Polarized Operations *Xuexia Yang, Guannan Tan, Yeqing Wang* (China)	**384**
11:30 - 11:50	Design of a Circularly Polarized Elliptical Patch Antenna using Artificial Neural Networks and Adaptive Neuro-Fuzzy Inference System *Aarti Gehani, Jignesh Ghadiya, Dhaval Pujara* (India)	**388**
11:50 - 12:10	Circularly Polarized Micrstrip Antenna Based on Waveguided Magneto-Dielectrics *Xinmi Yang, Huiping Guo, Xueguan Liu* (China)	**391**

2013-10-24 AM
Room D

ORAL Session: TA-1(D)
Measurements
Session Chair: Hiroyoshi Yamada, Ji Yang

08:00 - 08:20	Fast Measurement Technique Using Multicarrier Signal for Transmit Array Antenna Calibration *Kazunari Kihira, Toru Takahashi, Hiroaki Miyashita* (Japan)	**396**
08:20 - 08:40	Evaluation of RCS Measurement Environment in Compact Anechoic Chamber *Naobumi Michishita, Tadashi Chisaka, Yoshihide Yamada* (Japan)	**400**
08:40 - 09:00	Stable Parameter Estimation of Compound Wishart Distribution for Polarimetric SAR Data Modeling *Yi Cui, Hiroyoshi Yamada, Yoshio Yamaguchi* (Japan)	**404**
09:00 - 09:20	Narrow Pulse Transient Scattering Measurements and Elimination of Multi-path Interference *Zichang Liang, Wei Gao, Jinpeng Fang* (China)	**408**
09:20 - 09:40	A Composite Electromagnetic Absorber for Anechoic Chambers *Weijia Duan, Han Chen, Mingming Sun, Yi Ding, Xiaohan Sun, Chun Cai, Xueming Sun* (China)	**412**

ORAL Session: TA-2(D)
Radio Propagation
Session Chair: Mazlina Esa, Dongya Shen

10:30 - 10:50	A 3-D FDTD Scheme for the Computation of HPM Propagation in Atmosphere *Ke Xiao, Shunlian Chai, Haisheng Zhang, Huiying Qi, Ying Liu* (China)	**416**
10:50 - 11:10	Analysis of Schumann Resonances based on the International Reference Ionosphere *Yi Wang, Xiao Yuan, Qunsheng Cao* (China)	**419**
11:10 - 11:30	Quantitative Analysis of Rainfall Variability in Tokyo Tech MMW Small-Scale Model Network *Hung V.Le, Takuichi Hirano, Jiro Hirokawa, Makoto Ando* (Japan)	**422**
11:30 - 11:50	A Nyström-Based Esprit Algorithm for DOA Estimation of Coherent Signals *Yuanming Guo, Wei Li, Yanyan Zuo, Junyuan Shen* (China)	**426**
11:50 - 12:10	Impact of Reconfiguring Inclination Angle of Client's Antenna on Radio Channel Characteristics of IEEE802.11ac System *Hassan El-Sallabi, Mohamed Abdallah, Khalid Qaraqe* (Qatar)	**430**

2013-10-24 AM
Room E

09:40 - 10:30	**POSTER Session: TA-P**	
P.1	Low Frequency Characteristics of Electric Wire Antenna onboard Scientific Spacecraft *Tomohiko Imachi, Ryoichi Higashi, Mitsunori Ozaki, Satoshi Yagitani* (Japan)	**435**
P.2	Design of Broad Beam Circular-Polarized Microstrip Antenna *Dapeng Fan, Zongxin Wang, Bo Huang, Wei Zhang* (China)	**439**
P.3	Ultra Wide Band and Minimized Antenna *Mohammad Alibakhshi Kenari* (Iran)	**442**
P.4	Miniaturized Dual-Polarized Ultra-Wideband Tapered Slot Antenna *Fuguo Zhu, Steven ShichangGao, Anthony TSHo, Tim WCBrown, Jianzhou Li, Gao Wei, Jiadong Xu* (United Kingdom)	**446**
P.5	A Compact Printed Monopole Antenna with coupled elements for GSM/UMTS/LTE and UWB in mobile *Ohboum Kwon, Woojoong Kim, Young joong Yoon* (South Korea)	**450**
P.6	A Compact Triple-band Monopole Antenna for WLAN/WIMAX Application *Huifen Huang, Shaofang Zhang* (China)	**454**
P.7	A Hexa-band Coupled-fed PIFA Antenna for 4G Mobile Phone Application *Zhenglan Xie, Wenbin Lin, Guangli Yang* (China)	**458**
P.8	A Single Feed Circularly Polarized RFID Reader Antenna with Fractal Boundary *Minghui Cao, Zhuo Li* (China)	**461**
P.9	Novel Compact Circularly Polarized Patch Antenna for UHF RFID Handheld Reader *M.J. Chang, Hua-Ming Chen, Yi-Fang Lin, Wilson W.C.Chiu* (Taiwan)	**464**
P.10	Direction-of-Arrival Estimation for Closely Coupled Dipoles Using Embedded Pattern Diversity *Yanhui Liu, Xiaoping Xiong, Shulin Chen, Qing HuoLiu, Kun Liao, Jinfeng Zhu* (China)	**467**
P.11	Low Profile Printed Dipole Array *Jingjian Huang, Shaoyi Xie, Weiwei Wu, Naichang Yuan* (China)	**470**
P.12	A Time Domain analysis for a hyperbolic reflector antenna based on a mathematic continuation of ellipsoidal surface curvatures *Shih-Chung Tuan, Hsi-Tseng Chou* (Taiwan)	**472**
P.13	A Beam Steerable Plane Dielectric Lens Antenna *Yingsong Zhang, Wei Hong, Yan Zhang* (China)	**476**
P.14	Analysis and Design of Inhomogeneous Single Layer Slotted Dielectric Flat Lens *Mustafa K. Taher Al-Nuaimi, Wei Hong* (China)	**480**
P.15	Perforated Transmitarray-Enhanced Circularly Polarized Antennas for High-Gain Multi-Beam Radiation *Saber H.Zainud-Deen, Shaymaa M.Gaber, Hend Abd El-AzemMalhat, Kamal H.Awadalla* (Egypt)	**484**
P.16	Research on a Novel Millimeter-wave Linear MEMS Array Antenna Based on Hadamard Matrix *Shuyuan Shi, Yongsheng Dai* (China)	**488**
P.17	Design of Compact 4X4 X-band Butler with Lump Element Based on IPD Technology *Lu Ning, Liguo Sun* (China)	**492**

P.18 Design of a Dual-band Shared-Aperture Antenna Based on Frequency Selective Surface **496**
Bo Yan, Yuanming Zhang, Long Li (China)

P.19 Research on Side-lobe Radiation Characteristic of Printed Dipole Array
Hailiang Xiong, Dongan Song, Qi Zhang, Mingliang Huang, Kai Zhang (China) **500**

P.20 Experimental Study of A Ka-band Waveguide-fed Longitudinal Slot Phased Array
Lei Qiu, Hai-Sheng Zhang, Liang-Feng Ye, Ying Liu, Shun-Lian Chai (China) **504**

P.21 Wide-Angle Impedance Matching of Phased-Array Antenna Using Overlapped Subarrays **508**
Runliang Xia, Shiwei Qu, Minyao Xia, Zaiping Nie (China)

P.22 Design of the Automatic Test System of Active TR module
Han Liu, Xin Zheng, Zhipeng Zhou, Qiang Zhang, Yiyuan Zheng (China) **512**

P.23 The Application Analysis of GaN High Power Chips in T/R Modules
Can Lin, Han Liu, Yiyuan Zheng (China) **515**

P.24 Compact Multi-band Circularly Polarized Antenna for GNSS Applications
Jianxing Li, Hongyu Shi, Hang Li, Kai Feng, Anxue Zhang (China) **519**

P.25 Simulation of Two Compact Antipodal Vivaldi Antennas With Radiation Characteristics Enhancement **523**
Qiancheng Ying, Wenbin Dou (China)

P.26 Design of a Compact UWB Band-notched Antenna with Modified Ground Plane
Tong Li, Huiqing Zhai, Jianhui Bao, Changhong Liang (China) **527**

P.27 A Compact Ultra Wideband Antenna with Triple-Sense Circular Polarization
Guihong Li, Huiqing Zhai, Tong Li, Long Li, Changhong Liang (China) **531**

P.28 Design of a Broadband Cavity-Backed Multislot Antenna
Jing-yu Yang, Yan-ming Liu, Wen-jun Lu, Hong-bo Zhu (China) **535**

P.29 Development of a Compact Planar Multiband MIMO Antenna for 4G/LTE/WLAN Mobile Phone Standards **539**
Foez Ahmed, Ronglin Li, Ying Feng (China)

P.30 A Conical Quadrifilar Helix Antenna for GNSS Applications
Baiquan Ning, Juan Lei, Yongchao Cao, Liang Dong (China) **543**

P.31 Design of a Dual Frequency and Dual Circularly Polarized Microstrip Antenna Array with Light Weight and Small Size **547**
Tongbin Yu, Hongbin LI, Xinjian Zhong, Weigang Zhu, Tao Yang (China)

P.32 Wideband High-Gain Low-Profile 1D Fabry-Perot Resonator Antenna
Yuehe Ge, Can Wang, Xiaohu Zeng (China) **550**

P.33 Bandwidth Improvement Through Slot Design on RLSA Performance
Imran Mohd Ibrahim, Tharek Abdul Rahman, Mursyidul Izham Sabran (Malaysia) **553**

P.34 A Broadband Center-Fed Circular Microstrip Monopolar Patch Antenna with U-Slots **557**
Kang Yue, Juhua Liu, Zhixi Liang, Yunliang Long (China)

P.35 Design of a Compact Multi-Band Circularly-Polarized Microstrip Antenna
Jie Yang, Chunlan Lu, Juhong Shen (China) **561**

P.36 A Pattern Reconfigurable Quasi-Yagi Antenna with Compact Size
Pengkai Li, Zhenhai Shao, Yujian Cheng, Quan Wang, Long Li, Yongmao Huang (China) **565**

2013-10-24 PM
Room A

ORAL Session: TP-1(A)
Body-central Antennas
Session Chair: Koichi ITO, Zhao Wang

13:30 - 13:50	Multi-Functional Small Antennas for Health Monitoring Systems (Invited Paper) *Chia-Hsien Lin, Koichi Ito, Masaharu Takahashi, Kazuyuki Saito* (Japan)	**569**
13:50 - 14:10	Performance of An Implanted Tag Antenna in Human Body (Invited Paper) *Hoyu Lin, Masaharu Takahashi, Kazuyuki Saito, Koichi Ito* (Japan)	**573**
14:10 - 14:30	Design of Low Profile On-body Directional Antenna *Juneseok Lee, Jaehoon Choi* (South Korea)	**577**
14:30 - 14:50	K-factor Dependent Multipath Characterization for BAN-OTA Testing Using a Fading Emulator *Kun Li, Kazuhiro Honda, Koichi Ogawa* (Japan)	**580**
14:50 - 15:10	Development of VHF-band Antenna Mounted on the Helmet *Yuma Ono, Yoshinobu Okano* (Japan)	**584**

ORAL Session: TP-2(A)
Body-central Propagation
Session Chair: Yang Hao, Yoshinobu Okano

16:00 - 16:20	Signal Propagation Analysis for Near-Field Intra-Body Communication Systems (Invited Paper) *Kohei Nagata, Tomonori Nakamura, Mami Nozawa, Yuichi Kado, Hitoshi Shimasaki, Mitsuru Shinagawa* (Japan)	**589**
16:20 - 16:40	Numerical investigation on a Body-Centric Scenario at W Band (Invited Paper) *Khaleda Ali, Alessio Brizzi, Alice Pellegrini, Yang Hao* (United Kingdom)	**593**
16:40 - 17:00	A Wearable Repeater Relay System for Interactive Real-time Wireless Capsule Endoscopy (Invited Paper) *Sam Agneessens, Thijs Castel, Patrick Van Torre, Emmeric Tanghe, Günter Vermeeren, Wout Joseph, Hendrik Rogier* (Belgium)	**597**
17:00 - 17:20	Phase Characterization of 1-200 MHz RF Signal Coupling with Human Body (Invited Paper) *Nannan Zhang, Zedong Nie, Lei Wang* (China)	**601**
17:20 - 17:40	Electromagnetic Wave Propagation of Wireless Capsule Antennas in the Human Body *Zhao Wang, Enggee Lim, Meng Zhang, Jingchen Wang, Tammam Tillo, Jinhui Chen* (China)	**605**

2013-10-24 PM
Room B

ORAL Session: TP-1(B)
SIW Antennas & Devices
Session Chair: Jian Yang, Jiro Hirokawa

13:30 - 13:50	Substrate Integrated Waveguide Antenna Arrays for High-Performance 60 GHz Radar and Radio Systems (Invited Paper) *Ajay Babu Guntupalli, Ke Wu* (Canada)	**610**
13:50 - 14:10	A New E-plane Bend for SIW Circuits and Antennas Using Gapwave Technology (Invited Paper) *Jian Yang, Ali Razavi Parizi* (Sweden)	**614**
14:10 - 14:30	Simplified Wavelength Calculations for Fast and Slow Wave Metamaterial Ridged Waveguides and their Application to Array Antenna Design (Invited Paper) *Hideki Kirino, Koichi Ogawa* (Japan)	**617**
14:30 - 14:50	A Novel SIW Slot Antenna Array Based on Broadband Power Divider *Dongfang Guan, Zuping Qian, Yingsong Zhang, Yang Cai* (China)	**621**
14:50 - 15:10	Novel Antipodal Linearly Tapered Slot Antenna Using GCPW-to-SIW Transition for Passive Millimeter-Wave Focal Plane Array Imaging *Wen Wang, Xuetian Wang, Wei Wang, Aly E.Fathy* (China)	**625**

ORAL Session: TP-2(B)
Integrated MMW Antennas
Session Chair: Yueping Zhang, Bing Zhang

16:00 - 16:20	The Substrate and Ground Plane Size Effect on Radiation Pattern of 60-GHz LTCC Patch Antenna Array (Invited Paper) *Lei Wang, Yongxin Guo, Wen Wu* (Singapore)	**630**
16:20 - 16:40	Ultra-broadband Tapered Slot Terahertz Antennas on Thin Polymeric Substrate (Invited Paper) *Masami Inoue, Masayuki Hodono, Shogo Horiguchi, Masayuki Fujita, Tadao Nagatsuma* (Japan)	**633**
16:40 - 17:00	A D-Band Packaged Antenna on Low Temperature Co-Fired Ceramics for Wire-Bond Connection with an Indium Phosphide Detector (Invited Paper) *Bing Zhang, Li Wei, Herbert Zirath* (Sweden)	**637**
17:00 - 17:20	Circuit Model and Analysis of Antenna-in-Package (Invited Paper) *Li Li, Wenmei Zhang* (China)	**641**
17:20 - 17:40	Design, Simulation and Measurement of a 120GHz On-Chip Antenna in 45 nm CMOS for High-Speed Short-Range Wireless Connectors (Invited Paper) *Noel Deferm, Patrick Reynaert* (Belgium)	**645**

2013-10-24 PM
Room C

ORAL Session: TP-1(C)
Reflector & Air-fed Array
Session Chair: Hisamatsu Nakano, Zhi-Hang Wu

13:30 - 13:50	A Wideband Dipole Feed for Big Reflector Antenna *Jinglong Yu, Chengjin Jin* (China)	**650**
13:50 - 14:10	Low Sidelobe Compact Reflector Antenna Using Backfire Primary Radiator for Ku-Band Mobile Satellite Communication System on Board Vessel *Shinichi Yamamoto, Shuji Nuimura, Tomohiro Mizuno, Yoshio Inasawa, Hiroaki Miyashita* (Japan)	**653**
14:10 - 14:30	Fully Metallic Compound Air-fed Array Antennas for 13 GHz Microwave Radio-link Applications *Zhi-Hang Wu, Wen-Xun Zhang* (China)	**657**
14:30 - 14:50	Broadband Circularly Polarized Fabry-Perot Resonator Antenna *Zhenguo Liu, Yongxin Guo, Na Xie* (China)	**661**
14:50 - 15:10	Monopulse Fabry-Perot Resonator Antenna *Zhenguo Liu, Yongxin Guo* (China)	**664**

ORAL Session: TP-2(C)
Array for Radar Systems
Session Chair: Cornelis G. van 't Klooster, Fan Yang

16:00 - 16:20	Reflect-Array Sub-Reflector in X-Ka Band Antenna *C. G.van 't Klooster, A. Pacheco, C. Montesano, J. A.Encinar, A. Culebras* (Netherlands)	**669**
16:20 - 16:40	Design of a 60 GHz Band 3-D Phased Array Antenna Module Using 3-D SiP Structure *Yuya Suzuki, Satoshi Yoshida, Suguru Kameda, Noriharu Suematsu, Tadashi Takagi, Kazuo Tsubouchi* (Japan)	**673**
16:40 - 17:00	Design of Low Side Lobe Level Milimeter-Wave Microstrip array antenna for Automotive Radar *Donghun Shin, Kibeom Kim, Jongguk Kim, Seongook Park* (South Korea)	**677**
17:00 - 17:20	Realizing Sample Matrix Inversion (SMI) in Digital BeamForming (DBF) System *Hao Lei, Zaiping Nie, Feng Yang* (China)	**681**
17:20 - 17:40	Co-aperture dual-band waveguide monopulse antenna *Yuanwun Liu, Fengwei Yao, Yuanbo Shang* (China)	**685**

2013-10-24 PM
Room D

ORAL Session: TP-1(D)
Mobile & Indoor Propag.
Session Chair: Zhizhang Chen, Nadir Hakem

13:30 - 13:50	Propagation Models for Simulation Scenario of ITS V2V Communications *Hisato Iwai, Ryoji Yoshida, Hideichi Sasaoka* (Japan)	**689**
13:50 - 14:10	Comparison of Small-Scale parameters at 60 GHz for Underground Mining and Indoor Environments *Yacouba Coulibaly, Gilles YDelise, Nadir Hakem* (Canada)	**693**
14:10 - 14:30	Study on the Effect of Radiation Pattern on the Field Coverage in Rectangular Tunnel by FDTD method and Point Source Array Approximation *Dawei Li, Yuwei Huang, Junhong Wang, Mei-E Chen, Zhan Zhang* (China)	**697**
14:30 - 14:50	Modelling of Electromagnetic Propagation Characteristics in Indoor Wireless Communication Systems Using the LOD-FDTD method *Meng-Lin Zhai, Wen-Yan Yin, Zhizhang Chen* (China)	**701**
14:50 - 15:10	Design of Multi-channel Rectifier with High PCE for Ambient RF Energy Harvesting *Zheng Zhong, Hucheng Sun, Yongxin Guo* (Singapore)	**705**

ORAL Session: TP-2(D)
Wire Antennas
Session Chair: Dau-Chyrh Chang, Hiroyuki Arai

16:00 - 16:20	Loop Antenna Array for IEEE802.11b/g *Dau-Chyrh Chang, Win-Ming Liang* (Taiwan)	**709**
16:20 - 16:40	Ground Radiation Antenna using Magnetic Coupling Structure. *Hyunwoong Shin, Yang Liu, Jaeseok Lee, Hyunghoon Kim, Hyeongdong Kim* (South Korea)	**713**
16:40 - 17:00	A Planar Coaxial Collinear Antenna with Rectangular Coaxial Strip *Jiao Wang, Xueguan Liu, Xinmi Yang, Huiping Guo* (China)	**716**
17:00 - 17:20	Analysis of a Horizontally Polarized Antenna with Omni-Directivity in Horizontal Plane Using the Theory of Characteristic Modes *Shen Wang, Hiroyuki Arai* (Japan)	**720**
17:20 - 17:40	High Gain Spiral Antenna with Conical Wall *Jaehwan Jeong, Kyeongsik Min, Inhwan Kim, Sungmin Kim* (South Korea)	**723**
17:40 - 18:00	Asymmetric TEM Horn Antenna for Improved Impulse Radiation Performance *Hyeongsoon Park, JaeSik Kim, Youngjoong Yoon, JiHeon Ryu, JinSoo Choi* (South Korea)	**725**

2013-10-24 PM
Room E

15:10 - 16:00	**POSTER Session: TP-P**	
P.1	An UWB Rotated Cross Monopole Antenna *Jian Ren, Xueshi Ren, Yingzeng Yin* (China)	**730**
P.2	A Design of Miniaturized Dual-band Antenna *Lu Wang, Jingping Liu, Qian Wei, Safieddin Safavi-Naeini* (China)	**734**
P.3	Design of Single-Layer Single-Feed Patch Antenna for GPS and WLAN Applications *Zeheng Lai, Jiade Yuan* (China)	**737**
P.4	The design of an ultra-wide band spiral antenna *Li Zhi, Zhang XiYu, Quanguo Sun* (China)	**740**
P.5	A Wide Bandwidth Circularly Polarized Microstrip Antenna Array Using Sequentially Rotated Feeding Technique *Tongbin Yu, Hongbin LI, Xinjian Zhong, Tao Yang, Weigang Zhu* (China)	**743**
P.6	Equivalent Radius Analytic Formulas of Substrate Integrated Cylindrical Cavity *Xiu-zhen Luan, Ke-jun Tan* (China)	**746**
P.7	Analysis about the Influence of Terrain on the Fair-weather Atmospheric Electric Field Measurements *Jun Liu, Jia-qing Chen, Xiang-yu Liu, Li-zhi Yang* (China)	**750**
P.8	A Novel Reconfigurable Bandpass Filter Using Varactor-Tuned Stepped-Impedance-Stubs *Min Ou, Yuhang He, Liguo Sun* (China)	**754**
P.9	Multi-Band Filters Based on Same Phase Extension Scheme *Xumin Yu, Xiaohong Tang, Fei Xiao, Xinyang He* (China)	**757**
P.10	A Novel C-band Frequency Selective Surface Based on Complementary Structures *Jing Wang, Ming Bai* (China)	**761**
P.11	Three-dimensional Random Modeling of Particle Packing Through Growth Algorithm and the Microwave Propagation in the Model *Zhixian Xia, Yujian Cheng, Yong Fan, Haochi Zhang* (China)	**764**
P.12	Simulation study of a waveguide power combining network *Z.X. Wang, B. Xiang, M. M. He, W.B. Dou* (China)	**768**
P.13	Closed-Form Design Equations for Four-Port Crossover with Arbitrary Phase Delay *Ge Tian, Chen Miao, Jin PingYang, sheng CaiShi, Wen Wu* (China)	**771**
P.14	Super-resolution and Frequency Spectrum Characteristics of Micro-structured Array Based on Time Reversal Electromagnetic Wave *Huilin Tu, Shaoqiu Xiao, Jiang Xiong, Bingzhong Wang* (China)	**775**
P.15	A Miniaturized Tunable Bandpass Filter Using Asymmetric Coupled lines and Varactors *Yuhang He, Min Ou, Liguo Sun* (China)	**779**
P.16	Analysis of Terahertz Smith-Purcell Radiation Generated from Tapered Grating by PIC Simulation *Wenxin Liu* (China)	**783**
P.17	An Efficient Modal Series Representation of Green's Function of Planar Layered Media for All Ranges of Distances from Source Using CGF-PML-RFFM *Abdorreza Torabi, Amir Ahmad Shishegar* (Iran)	**787**

P.18 Parallel Computation of Complex Antennas Around the Coated Object Using Hybrid Higher-Order MoM and PO Technique **791**
Ying Yan, Xunwang Zhao, Yu Zhang, Changhong Liang, Jingyan Mo, Zhewang Ma (China)

P.19 Combination of Ultra-Wide Band Characteristic Basis Function Method and Asymptotic Waveform Evaluation Method in MoM Solution **795**
A-Min Yao, Wen Wu, Jun Hu, Da-Gang Fang (China)

P.20 A Mesh-Tearing Sub-Entire Domain Basis Function Method for Improved Electromagnetic Analysis of Strong-Coupled Cube Array **799**
Lin Liu, Xiaoxiang He, Chen Liu, Yang Yang (China)

P.21 Apply Complex Source Beam Technique for Effective NF-FF Transformations
Shih-Chung Tuan, Hsi-Tseng Chou, Prabhakar H Pathak (Taiwan) **803**

P.22 A Compressed Best Uniform Approximation for Fast Computation of RCS over Wide Angular-band **807**
Zhiwei Liu, Shan He, Yueyuan Zhang, Xiaoyan Zhang, Yingting Liu, Jun Xu (China)

P.23 Study on the Thin-Film Solar Cell with Periodic Structure Using FDFD Method
Yuan Wei, Bo Wu, Zhixiang Huang, Xianliang Wu (China) **811**

P.24 Accurate Evaluation of RCS on the Structure of Aircraft Inlets
Jingyan Mo, Ying Yan, Weidong Fang, Haigao Xue, Zhewang Ma (China) **815**

P.25 Error Analysis of a Novel Absorbing Boundary Condition for the 3-Step LOD-FDTD Method **819**
Lina Cao, Jianyi Zhou (China)

P.26 Application of Liao's ABC in 2-D FDFD Algorithm
Tongbin Yu, Lei Zhang, Yanhui Zhao (China) **822**

P.27 A hybrid FE-BI-DDM for electromagnetic scattering by multiple 3-D holes
Zhiwei Cui, Yiping Han, Meiping Yu (China) **826**

P.28 Numerical Simulation of Complex Inhomogeneous Bodies of Revolution
Yongbo Zhai, J.F Zhang, T.J Cui (China) **830**

P.29 Full Wave Simulation of the Transfer Response of the TX and RX Antennas in the Full-Duplex Wireless Communication Systems **834**
Yunyang Dong, Jianyi Zhou, Binqi Yang, Jianing Zhao (China)

P.30 Research of radio wave propagation in forest based on Non-uniform mesh Parabolic Equation **838**
Qinghong Zhang, Cheng Liao, Nan Sheng, Linglu Chen (China)

P.31 Fast Calculation Method of Target's Monostatic RCS Based on BCGM
Xiaofei Xu, Jing Li (China) **842**

P.32 New Discretized Schemes of 1st Mur's ABC and Its Applications to Scattering Problems **845**
Quan Yuan, Lianyou Sun, Wei Hong (China)

P.33 Full-Wave Analysis of Multiport Microstrip Circuits by Efficient Evaluation of Multilayered Green's Functions in Spatial Domain **849**
Zhe Song, Yan Zhang (China)

P.34 Analysis of the Antenna in Proximity of Human Body Base on the Dual-Grid FDTD Method **853**
Hai-Sheng Zhang, Ke Xiao, Lei Qiu, Hui-Ying Qi, Liang-Feng Ye, Shun-Lian Chai (China)

P.35 Design of Millimeter Wave Waveguide-Fed Omnidirectional Slotted Array Antenna **857**
Mohsen Chaharmahali, Narges Noori (Iran)

2013-10-25 AM
Room A

ORAL Session: FA-1(A)
A &P for Mobile Comm.
Session Chair: J. W. Modelski, Eko T Rahardjo

08:00 - 08:20	Emerging Antennas for Modern Communication Systems (Invited Paper) *J. W. Modelski* (Poland)	**862**
08:20 - 08:40	Tunable Antenna Impedance Matching for 4G Mobile Communications *Peng Liu, Andreas Springer* (Austria)	**863**
08:40 - 09:00	A dual-band and dual-polarized microstrip antenna subarray design for Ku-band satellite communications *Yong Fu, Zhiping Yin, Guoqiang Lv* (China)	**867**
09:00 - 09:20	Circularly Polarized Microstrip Antenna Array for UAV Application *Eko TRahardjo, Fitri YZulkifli, Desriansyah YHerwanto, Basari, Josaphat TSri Sumantyo* (Indonesia)	**870**
09:20 - 09:40	Interpolation of Communication Distance in Urban and Suburban Areas *Kazunori Uchida, Masafumi Takematsu, Jun-Hyuck Lee, Keisuke Shigetomi, Junichi Honda* (Japan)	**873**

ORAL Session: FA-2(A)
A &P for MIMO Comm.
Session Chair: Richard W Ziolkowski, Jiaying Zhang

10:30 - 10:50	MIMO 2x2 Reference Antennas – Measurement Analysis Using the Equivalent Current Technique *Alessandro Scannavini, Lucia Scialacqua, Jiaying Zhang, Lars Foged, Muhammad Zubair, J. L. A. Quijano, G. Vecchi* (France)	**878**
10:50 - 11:10	Design of a High Isolation Dual-band MIMO Antenna for LTE Terminal *Lili Wang, Chongyu Wei, Weichen Wei* (China)	**881**
11:10 - 11:30	Slot Ring Triangular Patch Antenna with Stub for MIMO 2x2 Wireless Broadband Application *Fitri YuliZulkifli, Daryanto , Eko TjiptoRahardjo* (Indonesia)	**885**
11:30 - 11:50	Simple Models for Multiplexing Throughputs in Open- and Closed-Loop MIMO Systems with Fixed Modulation and Coding for OTA Applications *Xiaoming Chen, Per-Simon Kildal, Mattias Gustafsson* (Sweden)	**888**
11:50 - 12:10	Channel estimation method using MSK signals for MIMO sensor *Keita Ushiki, Kentaro Nishimori, Tsutomu Mitsui, Nobuyasu Takemura* (Japan)	**892**

2013-10-25 AM
Room B

ORAL Session: FA-1(B)
MMW & THz Antennas
Session Chair: Xiaodong Chen, Makoto Ando

08:00 - 08:20	Transmission System for Terahertz Pre-amplified Coaxial Digital Holographic Imager (Invited Paper) *Wenyan Ji, Haitao Wang, Zejian Lu, Yuan Yao, Junsheng Yu, Xiaodong Chen* (China)	**897**
08:20 - 08:40	Millimeter Wave Power Divider Based on Frequency Selective Surface (Invited Paper) *Wenyan Ji, Haitao Wang, Xiaoming Liu, Yuan Yao, Junsheng Yu, Xiaodong Chen* (China)	**901**
08:40 - 09:00	Equivalent Radius of Dipole-patch Nanoantenna with Parasitic Nanoparticle at THz band *M. K. H. Ismail, M. Esa, N. N. NIk Abd. Malek, S. A. Hamzah, N. A. Murad, M. F. Mohd. Yusoff, M. R. Hamid* (Malaysia)	**905**
09:00 - 09:20	Design and Implementation of A Filtenna with Wide Beamwidth for Q-Band Millimeter-Wave Short Range Wireless Communications *Zonglin Xue, Yan Zhang, Wei Hong* (China)	**909**
09:20 - 09:40	Design of Terahertz Ultra-wide Band Coupling Circuit Based on Superconducting Hot Electron Bolometer Mixer *Chun Li, Lei Qin, Miao Li, Ling Jiang* (China)	**913**

ORAL Session: FA-2(B)
MMW Antennas
Session Chair: Takeshi Manabe, Yan Zhang

10:30 - 10:50	Design of a Linear Array of Transverse Slots without Cross-polarization to any Directions on a Hollow Rectangular Waveguide *Nhu Quyen Duong, Makoto Sano, Jiro Hirokawa, Makoto Ando, Jun Takeuchi, Akihiko Hirata* (Japan)	**918**
10:50 - 11:10	Design of Package Cover for 60GHz Small Antenna and Effects of Device Box on Radiation Performance *Yuanfeng She, Ryosuke Suga, Hiroshi Nakano, Yasutake Hirachi, Jiro Hirokawa, Makoto Ando* (Japan)	**921**
11:10 - 11:30	A Novel 60 GHz Short Range Gigabit Wireless Access System using a Large Array Antenna *Miao Zhang, Jiro Hirokawa, Makoto Ando, Koji Tokosaki, Toru Taniguchi, Makoto Noda* (Japan)	**924**
11:30 - 11:50	60 GHz On-Chip Loop Antenna Integrated in a 0.18 μm CMOS Technology *Yuki Yao, Takuichi Hirano, Kenichi Okada, Jiro Hirokawa, Makoto Ando* (Japan)	**927**
11:50 - 12:10	Microstrip Comb-Line Antenna with Inversely Tapered Mode Transition and Slotted Stubs on Liquid Crystal Polymer Substrates *Ryohei Hosono, Yusuke Uemichi, Han Xu, Ning Guan, Yusuke Nakatani, Masahiro Iwamura* (Japan)	**930**

2013-10-25 AM
Room C

ORAL Session: FA-1(C)
Ant. Analysis & Synthesis
Session Chair: Riccardo E Zich, Toru Uno

08:00 - 08:20	A Modified BBO for Design and Optimization of Electromagnetic Systems (Invited Paper) *Marco Mussetta, Paola Pirinoli, Riccardo EZich* (Italy)	**935**
08:20 - 08:40	Understanding the Fundamental Radiating Properties of Antennas with Characteristic Mode Analysis *Danie Ludick, Gronum Smith* (South Africa)	**939**
08:40 - 09:00	Characterization of H2QL Antenna by Simulation *Erwin BDaculan, Elmer PDadios* (Philippines)	**940**
09:00 - 09:20	FDTD Analysis of Induced Current of PEC Wire Which In Contact with Half Space Lossy Ground by Using Surface Impedance Boundary Condition *Takuji Arima, Toru Uno* (Japan)	**944**
09:20 - 09:40	Synthesis of Cosecant Array Factor Pattern Using Particle Swarm Optimization *Min-Chi Chang, Wei-Chung Weng* (Taiwan)	**948**

ORAL Session: FA-2(C)
Freq. Selective Surface
Session Chair: Toshikazu Hori, Zhenguo Liu

10:30 - 10:50	Gain Enhancement for Multiband Fractal Antenna Using Hilbert Slot Frequency Selective Surface Reflector *Chamaiporn Ratnaratorn, Norakamon Wongsin, Prayoot Akkaraekthalin* (Thailand)	**953**
10:50 - 11:10	Unit Cell Structure of AMC with Multi-Layer Patch Type FSS for Miniaturization *Ying Ming, Kuse Ryuji, Hori Toshikazu, Fujimoto Mitoshi, Seki Takuya, Sato Keisuke, Oshima Ichiro* (Japan)	**957**
11:10 - 11:30	Scattering Analysis of Active FSS Structures Using Spectral-Element Time-Domain Method *Hao Xu, Jian Xi, Rushan Chen* (China)	**961**
11:30 - 11:50	A Novel Frequency Selective Surface for Ultra Wideband Antenna Performance Improvement *Huifen Huang, Shaofang Zhang, Yuanhua Hu* (China)	**965**
11:50 - 12:10	Terahertz Cassegrain Reflector Antenna *Xiaofei Xu, Xudong Zhang, Zhipeng Zhou, Tie Gao, Qiang Zhang, Youcai Lin, Lei Sun* (China)	**969**

2013-10-25 AM
Room D

ORAL Session: FA-1(D)
EM in Circuits-1
Session Chair: Dhaval Pujara, Qunsheng Cao

08:00 - 08:20	Simplified Modeling of Ring Resonator (RR) and Thin Wire Using Magnetization and Polarization with Loss Analysis *Dongho Jeon, Bomson Lee* (South Korea)	**973**
08:20 - 08:40	Transmission Characteristics of Via Holes in High-Speed PCB *He Xiangyang, Lei Zhenya, Wang Qing* (China)	**977**
08:40 - 09:00	Novel W-slot DGS for Band-stop Filter *Chen Lin, Minquan Li, Wei Wang, Jiaquan He, Wei Huang* (China)	**981**
09:00 - 09:20	Coupled-Mode Analysis of Two-Parallel Post-Wall Waveguides *Kiyotoshi Yasumoto, Hiroshi Maeda, Vakhtang Jandieri* (Japan)	**984**
09:20 - 09:40	Systematic Microwave Network Analysis for Arbitrary Shape Printed Circuit Boards With a Large Number of Vias *Xinzhen Hu, Liguo Sun* (China)	**988**

ORAL Session: FA-2(D)
EM in Circuits-2
Session Chair: Trevor S. Bird, Wenmei Zhang

10:30 - 10:50	A Novel Phase Shifter Based on Reconfigurable Defected Microstrip Structure (RDMS) for Beam-Steering Antennas (Invited Paper) *Can Ding, Jay Y.Guo, Pei-Yuan Qin, Trevor S.Bird, Yintang Yang* (Australia)	**993**
10:50 - 11:10	Transient Response Analysis of a MESFET Amplifier Illuminated by an Intentional EMI Source *Qifeng Liu, Jingwei Liu, Chonghua Fang* (China)	**997**
11:10 - 11:30	Crosstalk Analysis of Through Silicon Vias With Low Pitch-to-diameter ratio in 3D-IC *Sheng Liu, Jianping Zhu, Yongrong Shi, Xing Hu, Wanchun Tang* (China)	**1001**
11:30 - 11:50	Design of a Feed Network for Cosecant Squared Beam based on Suspended Stripline *Huiying Qi, Fei Zhao, Lei Qiu, Ke Xiao, Shunlian Chai* (China)	**1005**
11:50 - 12:10	The study on Crosstalk of Single Wire and Twisted-Wire Pair *Lijuan Tang, Zhihong Ye, Linglu Chen, Zheng Xiang, Cheng Liao* (China)	**1008**

2013-10-25 AM
Room E

09:40 - 10:30	**POSTER Session: FA-P**	
P.1	Bow-tie Shaped Meander Slot on-body Antenna *Chen Yang, Guang Hua, Ping Lu, Houxing Zhou* (China)	**1013**
P.2	Evaluation Koch Fractal Textile Antenna using Different Iteration toward Human Body *Mohd EzwanJalil, Mohamad KamalRahim, Noor AsmawatiSamsuri, Noor AsnizarMurad, Bashir DBala* (Malaysia)	**1017**
P.3	Compact UWB Antenna with Controllable Band Notches Based On Co-directional CSRR *Tong Li, Huiqing Zhai, Guihong Li, Changhong Liang* (China)	**1021**
P.4	ULTRA-WIDEBAND DUAL POLARIZED PROBE FOR MEASUREMENT APPLICATION *Yong Li, Meng Su, Yuzhou Sheng, Liang Dong* (China)	**1025**
P.5	Conformal Monopulse Antenna Design Based on Microstrip Yagi Antenna *Chen Ding, Wenbin Dou* (China)	**1029**
P.6	A Printed Monopole Antenna with Two Coupled Y-Shaped Strips for WLAN/WiMAX Applications *Zhihui Ma, Huiqing Zhai, Zhenhua Li, Bo Yan, Changhong Liang* (China)	**1032**
P.7	Planar Circularly Polarized Antenna with Broadband Operation for UHF RFID System *Jui-Han Lu, Hai-Ming Chin, Sang-Fei Wang* (Taiwan)	**1036**
P.8	A Frequency Selection Method Based on Fusion Algorithm in Bistatic HFSWR *Weiwei Chen, Changjun Yu, Wentao Chen* (China)	**1040**
P.9	Effects of Antenna Polarization on Power and RMS Delay Spread in LOS/OOS Indoor Radio Channel *Zhong-Yu Liu, Li-Xin Guo, Wei Tao, Chang-Long Li* (China)	**1044**
P.10	An RF Self-interference Cancellation Circuit for the Full-duplex Wireless Communications *Binqi Yang, Yunyang Dong, Zhiqiang Yu, Jianyi Zhou* (China)	**1048**
P.11	Ad Hoc Quantum Network Routing Protocol based on Quantum Teleportation *Xiaofei Cai, Xutao Yu, Xiaoxiang Shi, jin Qian, Lihui Shi, Youxun Cai* (China)	**1052**
P.12	The Service Modeling and Scheduling forWireless Access Network Oriented Intelligent Transportation System (ITS) *Xiaojun Wang, Haikuo Dai, Xiaoshu Chen* (China)	**1056**
P.13	Radio Channel Modeling and Measurement of a Localization Rescue System *Lunshang Chai, Jiao He, Xingchang Wei* (China)	**1060**
P.14	A Weighted OMP Algorithm for Doppler Super-resolution *Xiaochuan Wu, Weibo Deng, Yingning Dong* (China)	**1064**
P.15	Developing RSR for Chinese Astronomical Antenna and Deep Space Exploration *Jinsong Ping* (China)	**1068**
P.16	Microwave Attenuation and Phase Shift in Sand and Dust Storms *Qunfeng Dong, Yingle Li, Jiadong Xu, Mingjun Wang* (China)	**1069**
P.17	Experimental Research on Electromagnetic Wave Attenuation in Plasma *Li Wei, Suo Ying, Qiu Jinghui* (China)	**1072**
P.18	Modulation Recognition Based on Constellation Diagram for M-QAM Signals *Zhendong Chou, Weining Jiang, Min Li* (China)	**1075**

P.19 Broadband Four-Way Power Divider for Active Antenna Array Application
Lei Zhang, Xiaowei Zhu, Peng Chen, Ling Tian, Jianfeng Zhai (China) **1079**
P.20 Production of Bessel-Gauss Beams at THz by Use of UPA
Yanzhong Yu, Yanfei Li, Yunyan Wang (China) **1082**
P.21 Electromagnetic Scattering from Rough Sea Surface Covered with Oil Films
Xincheng Ren, Wenli Lei, Xiaomin Zhu, Wei Tian (China) **1086**
P.22 A FBLP Based Method for Suppressing Sea Clutter in HFSWR
Yongpeng Zhu, Chao Shang, Yajun Li (Hong Kong) **1090**
P.23 Radar HRRP Adaptive Denoising via Sparse and Redundant Representations
Min Li, Gongjian Zhou, Bin Zhao, Taifan Quan (China) **1094**
P.24 GPU based FDTD method for investigation on the electromagnetic scattering from 1-D rough soil surface **1098**
Chun-Gang Jia, Li-Xin Guo, Juan Li (China)
P.25 Research on the GPS Signal Scattering and Propagation in the Tropospheric Ducts
Guangcheng Lee, Lixin Guo, Jiejing Sun, Jianhua Ge (China) **1102**
P.26 Bandwidth Enhancement of PIFA with Novel EBG Ground
Yu Cao, Qiaona Qiu, Ying Liu, Shuxi Gong (China) **1106**
P.27 Artificial Magnetic Conductor and Its Application
Hongyuan Zhou, Feng Xu (China) **1110**
P.28 Working Principles of A Broadband/Dual-band Frequency Selective Structure with Quasi-Elliptic Response **1114**
Jianfeng Tan, Peiguo Liu, Xianjun Huang, Guohua Li, Cheng Yang (China)
P.29 Anisotropic Photonic Band Gaps in Three-dimensional Magnetized Plasma Photonic crystals **1118**
Hai-Feng Zhang, Shao-Bin Liu, Huan Yang (China)
P.30 Miniaturized Frequency Selective Surface with Bionic Structure
Wen Jiang, Tao Hong, Shuxi Gong (China) **1122**
P.31 Artificial Magnetic Conductor based on InP Technology
Yanjun Dai, Guoqing Luo, Yaping Liang (China) **1124**
P.32 A Compact Triple mode Metamaterial Inspired-Monopole Antenna for Wideband Applications **1127**
Bashir DBala, Mohamad Kamal BA Rahim, Noor Asniza Murad (Malaysia)
P.33 Field-circuit co-simulation for microwave metamaterials with nonlinear components **1131**
Delong Li, Jinfeng Zhu, Shanshan Wu, Xiaoping Xiong, Yanhui Liu, Qing H.Liu (China)
P.34 Metamaterial Absorber and Polarization Transformer Based on V-shape Resonator
Song Han, Helin Yang (China) **1134**
P.35 Design of Broadband Metamaterial Absorber Based on Lumped Elements
Xiaojun Huang, Helin Yang, Song Han (China) **1138**
P.36 A novel RF resonator using microstrip transmission line for human boby MRI at 3T **1141**
Hyeok-Woo Son, Young-Ki Cho, Hyungsuk Yoo (South Korea)

2013-10-25 PM
Room A

ORAL Session: FP-1(A)
Antennas for RFID
Session Chair: Kyeong-Sik Min, Wen Wu

13:30 - 13:50	A Low-Profile Dual-Band RFID Antenna Combined With Silence Element *Yongqiang Chen, Huiping Guo, Xinmi Yang, Xueguan Liu* (China)	**1146**
13:50 - 14:10	Impedance Matching Design of Small Normal Mode Helical Antennas for RFID Tags *Yi Liao, Yuan Zhang, Kun Cai, Zichang Liang* (China)	**1150**
14:10 - 14:30	Circularly Polarized Antenna with Circular Shaped Patch and Strip for Worldwide UHF RFID Applications *Yi Liu, Xiong-Ying Liu* (China)	**1154**
14:30 - 14:50	Material Property of On-metal Magnetic Sheet Attached on NFC/HF-RFID Antenna and Research of Its Proper Pattern and Size On *Naoki Ohmura, Eriko Takase, Satoshi Ogino, Yoshinobu Okano, Shyota Arai* (Japan)	**1158**
14:50 - 15:10	A Low-Profile Planar Broadband UHF RFID Tag Antenna for Metallic Objects *Zhen-Kun Zhang, Xiong-Ying Liu* (China)	**1162**

ORAL Session: FP-1(B)

Inversed Scattering

Session Chair: Yisok Oh, Xincheng Ren

13:30 - 13:50	Inversion of the dielectric constant from the co-polarized ratio and the co-polarized discrimination ratio of the scattering coefficient *Yuanyuan Zhang, Yaqing Li, Zhensen Wu, Xiaobing Wang* (China)	**1167**
13:50 - 14:10	Microwave Radiation Image Reconstruction Based on Combined TV and Haar Basis *Lu Zhu, Jiangfeng Liu, Yuanyuan Liu* (China)	**1171**
14:10 - 14:30	Imaging of object in the presence of rough surface using scattered electromagnetic field data *Pengju Yang, Lixin Guo, Chungang Jia* (China)	**1175**
14:30 - 14:50	A Simple and Accurate Model for Radar Backscattering from Vegetation-covered Surfaces *Yisok Oh, Soon-Gu Kweon* (South Korea)	**1179**
14:50 - 15:10	The Analysis of Sea Clutter Statistics Characteristics Based On the Observed Sea Clutter of Ku-Band Radar *Zhuo Chen, Xianzu Liu, Zhensen Wu, Xiaobing Wang* (China)	**1183**

ORAL Session: FP-1(C)

Slot Antennas

Session Chair: Tsenchieh Chiu, Peng Chen

13:30 - 13:50	Design of slot antenna loaded with lumped circuit components *Chichang Hung, Tayeh Lin, Hungchen Chen, Tsenchieh Chiu, Dachiang Chang* (Taiwan)	**1188**
13:50 - 14:10	Narrow-wall confined slotted waveguide structural antennas for small multi-rotor UAV *Derek Gray, Kunio Sakakibara, Yingdan Zhu* (China)	**1192**
14:10 - 14:30	Pattern Synthesis Method for a Center Holed Waveguide Slot Array Applied to Composite Guidance *Jingjian Huang, Shaoyi Xie, Weiwei Wu, Naichang Yuan* (China)	**1196**
14:30 - 14:50	Design and Measurement of a Parallel Plate Slot Array Antenna Fed by a Rectangular Coaxial Line *Hajime Nakamichi, Makoto Sano, Jiro Hirokawa, Makoto Ando, Katsumori Sasaki, Ichiro Oshima* (Japan)	**1199**
14:50 - 15:10	Circularly polarized square slot antenna for navigation system *Yixing Zeng, Yuan Yao, Junsheng Yu, Xiaodong Chen, Youbo Zhang* (China)	**1202**

ORAL Session: FP-1(D)

A&P in Mata-structures

Session Chair: Youngjoong Yoon, Yijun Feng

13:30 - 13:50	Radiation from a Metahelical Antenna (Invited Paper) *Hisamatsu Nakano, Miyu Tanaka, Junji Yamauchi* (Japan)	**1206**
13:50 - 14:10	Transformation Optical Design for 2D Flattened Maxwell Fish-Eye Lens *Guohong Du, Chengyang Yu, Changjun Liu* (China)	**1208**
14:10 - 14:30	Tunable Electromagnetic Gradient Surface For Beam Steering by Using Varactor Diodes *Jungmi Hong, Youngsub Kim, Youngjoong Yoon* (South Korea)	**1211**
14:30 - 14:50	Asymmetric Electromagnetic Wave Polarization Conversion through Double Spiral Chiral Metamaterial Structure *Linxiao Wu, Bo Zhu, Junming zhao, Yijun Feng* (China)	**1215**
14:50 - 15:10	Metamaterial Absorber with Active Frequency Tuning in X-band *Hao Yuan, Bo Zhu, Junming Zhao, Yijun Feng* (China)	**1219**

2013-10-25 PM
Room E

15:10 - 16:00	**POSTER Session: FP-P**	
P.1	A Novel Circular Polarized SIW Square Ring-slot Antenna *Fangfang Fan, Wei Wang, Zehong Yan* (China)	**1223**
P.2	Design and Optimization of Broadband Single-Layer Reflectarray *Kai Zhang, Steven Gao, Jianzhou Li, Gao Wei, Yangyu Fan, Jiadong Xu* (China)	**1226**
P.3	A Simple Broadband Patch Antenna *Guoming Gao, Hong Yuan, Ling Jian, Min Ma* (China)	**1230**
P.4	A Compact Dual-Band Assembled Printed Quadrifilar Helix Antenna for CNSS Application *Hao Wang, Kang Chen, Yong Huang, Jie Wang* (China)	**1233**
P.5	A Novel Broadband High-Isolation Cross Dipole Utilizing Strong Mutual Coupling *Zengdi Bao, Xianzheng Zong, Zaiping Nie* (China)	**1237**
P.6	Design of Feed Horn Integrated 380 GHz Sub-Harmonically Pumped Mixer Cavity *Xiaofan Yang, Liandong Wang, Bo Zhang, Xiong Xu* (China)	**1241**
P.7	Millimeter-Wave Cavity-Backed Patch-Slot Dipole for Circularly Polarized Radiation *Xue Bai, Shi-Wei Qu* (China)	**1244**
P.8	Compact Wideband Millimeter-Wave Substrate Integrated Waveguide Fed Interdigital Cavity Antenna Array *Yang Cai, Zuping Qian, Yingsong Zhang, Dongfang Guan* (China)	**1248**
P.9	Polarization Reconfigurable Cross-Slots Circular Patch Antenna *Mohamed Nasrun Osman, Mohamad Kamal A. Rahim, Mohd Fairus Mohd Yussof, Mohamad Rijal Hamid, Huda A. Majid* (Malaysia)	**1252**
P.10	A Configurable Dual-H Type Planar Slot Antenna Applicable for Communication Well *Shengjie Wang, Xueguan Liu, Xinmi Yang, Huiping Guo* (China)	**1256**
P.11	Quantum State Propagation in Quantum Wireless Multi-hop Network based on EPR pairs *Kan Wang, Xutao Yu, Shengli Lu* (China)	**1260**
P.12	The Restoring Casimir Force between Doped Silicon Slab and Metamaterials *Xue-Wei Li, Zhi-Xiang Huang, Xian-Liang Wu* (China)	**1264**
P.13	Fast Electromagnetic Simulation by Parallel MoM Implemented on CUDA *Ming Fang, Kai-Hong Song, Zhi-Xiang Huang, Xian-Liang Wu* (China)	**1268**
P.14	An Efficient DGTD Implementation of the Uniaxial Perfectly Matched Layer *Da Peng, Lin Chen, Wenlu Yin, Hu Yang* (China)	**1272**
P.15	A Graph-Theoretic Approach to Building Layout Reconstruction from Radar Measurements *Bo Chen, Tian Jin, Biying Lu, Zhimin Zhou, Pu Zheng* (China)	**1276**
P.16	The Imaging Approach of Sparse Interferometry to Microwave Radiation *Yuanyuan Liu, Suhua Chen, Lu Zhu* (China)	**1280**
P.17	A Hybrid Method for the study of the Mono-static Scattering from the Rough Surface and the Target Above It *Rui Wang, Shui-Rong Chai, Yi-Wen Wei, Li-Xin Guo* (China)	**1284**

P.18 A reconfigurable frequency selective surface for tuning multi-band frequency response separately **1288**
Jia Lin Yuan, Shaobin Liu, xiangkun kong, Huan Yang (China)

P.19 A Wideband Bandstop FSS with Tripole Loop
Ping Lu, Guang Hua, Chen Yang, Wei Hong (China) **1291**

P.20 Wide Angle and Polarization Insensitive Circular Ring Metamaterial Absorber at 10 GHz **1295**
Osman binAyop, Mohamad Kamal binA. rahim, Noor Asniza bintiMurad (Malaysia)

P.21 A Plasmonic Multi-directional Frequency Splitter
Yong Jin Zhou, Xue Xia Yang, Tie Jun Cui (China) **1298**

P.22 Channel Models for Indoor UWB Short Range Communications
Xiongen Zhao, Suiyan Geng (China) **1300**

P.23 Design of a Compact UWB Diversity Antenna for WBAN Wrist-Watch Applications **1304**
Seungmin Woo, Jisoo Baek, Hyungsang Park, Dongtak Kim, Jaehoon Choi (South Korea)

P.24 A Tablet MIMO Antenna with a Wave-Trap Slot for LTE/WiMAX Applications
Wen-Hsiu Hsu, Chung-Hsuan Wen, Shan-Cheng Pan, Huan-Yu Jheng (Taiwan) **1307**

P.25 The MIMO Antenna Design for a TD-LTE Mobile Phone
Wei Wang, Chongyu Wei, Weichen Wei (China) **1311**

P.26 High Port Isolation Co-Located Patch Antenna
Weiwen Li, B. Zhang, Y. H.Liu, B. Q.You (China) **1314**

P.27 Sensitivity Study for Improved Magnetic Induction Tomography (MIT) Coil System **1317**
Ziyi Zhang, Hengdong Lei, Peiguo Liu, Dongming Zhou (China)

P.28 An Improved TR Method for the Measurement of Permittivity of Powder and Liquid Samples with Slabline **1321**
Licun Han, Zhijun Xiang, Bingjie Tao, Minhui Zeng, Yu Zhang, En Li (China)

P.29 Design of Novel Slot UHF Near-Field Antenna for RFID Applications
Qichao Yang, Jingping Liu, Safieddin Safavi-Naeini (China) **1325**

P.30 UHF Electrically Large Near-Field RFID Reader Antenna Using Segmented Loop Unit **1328**
Longlong Lin, Jin Shi, Xianming Qing, Zhining Chen (China)

P.31 Resonator Bandpass Filter Using the Parallel Coupled Wiggly Line for Supurious Suppression **1332**
Pichai Arunvipas (Thailand)

P.32 Robust Optimization of PCB Differential-Via for Signal Integrity
Shilei Zhou, Guizhen Lu (China) **1336**

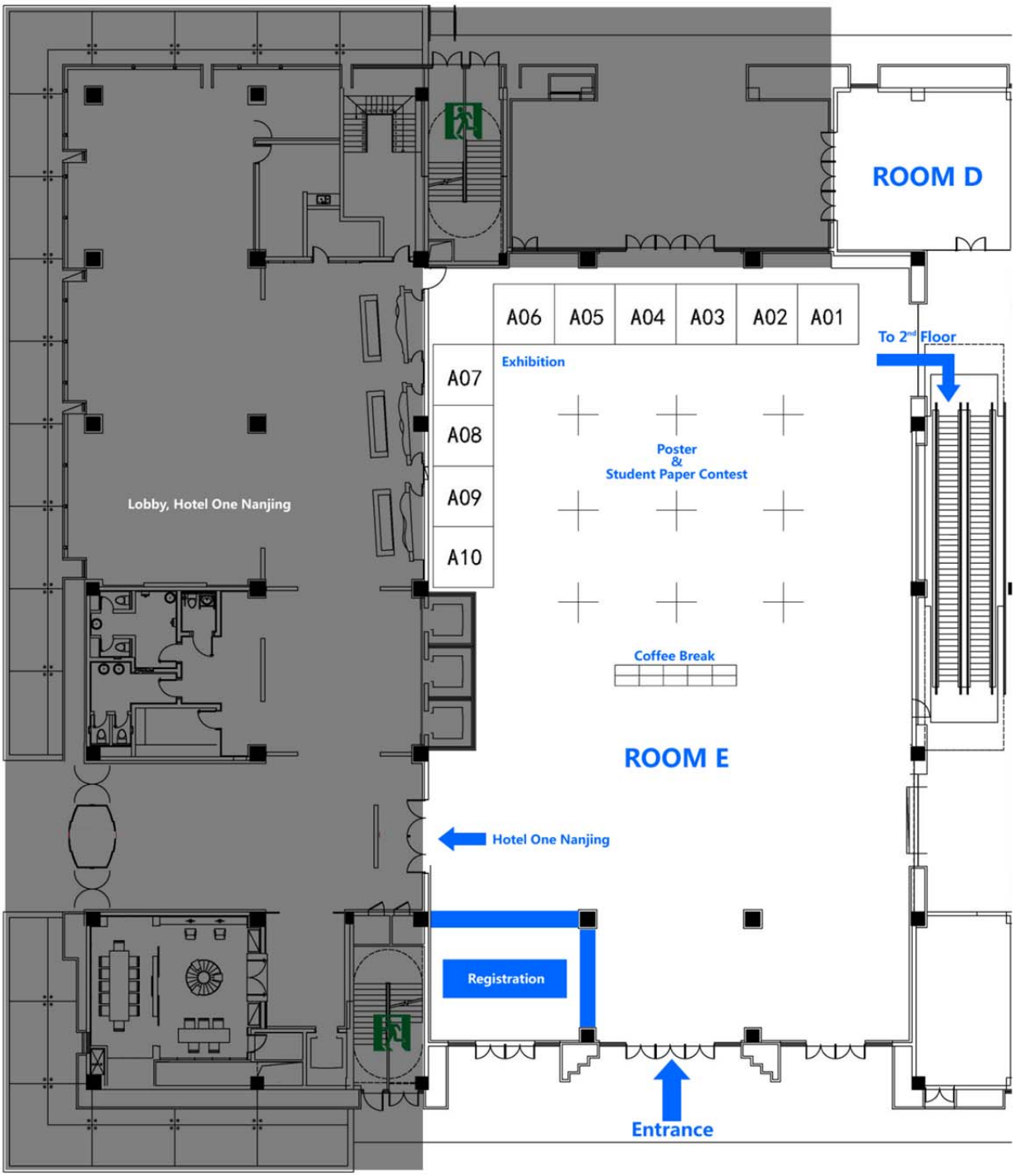
P.33 Modeling of the Cable-Induced Coupling into a Shielding Box Using BLT equation **1340**
Sufei Xiao, Zhen-Yi Niu, Jian-Feng Shi, Feng Liu (China)

P.34 Magnetic Near-Field Mapping of Printed Circuit Board in Microwave Frequency Band **1344**
Shunyun Lin, Jianhua Chen, Yating Pan, Tzungwern Chiou (Taiwan)

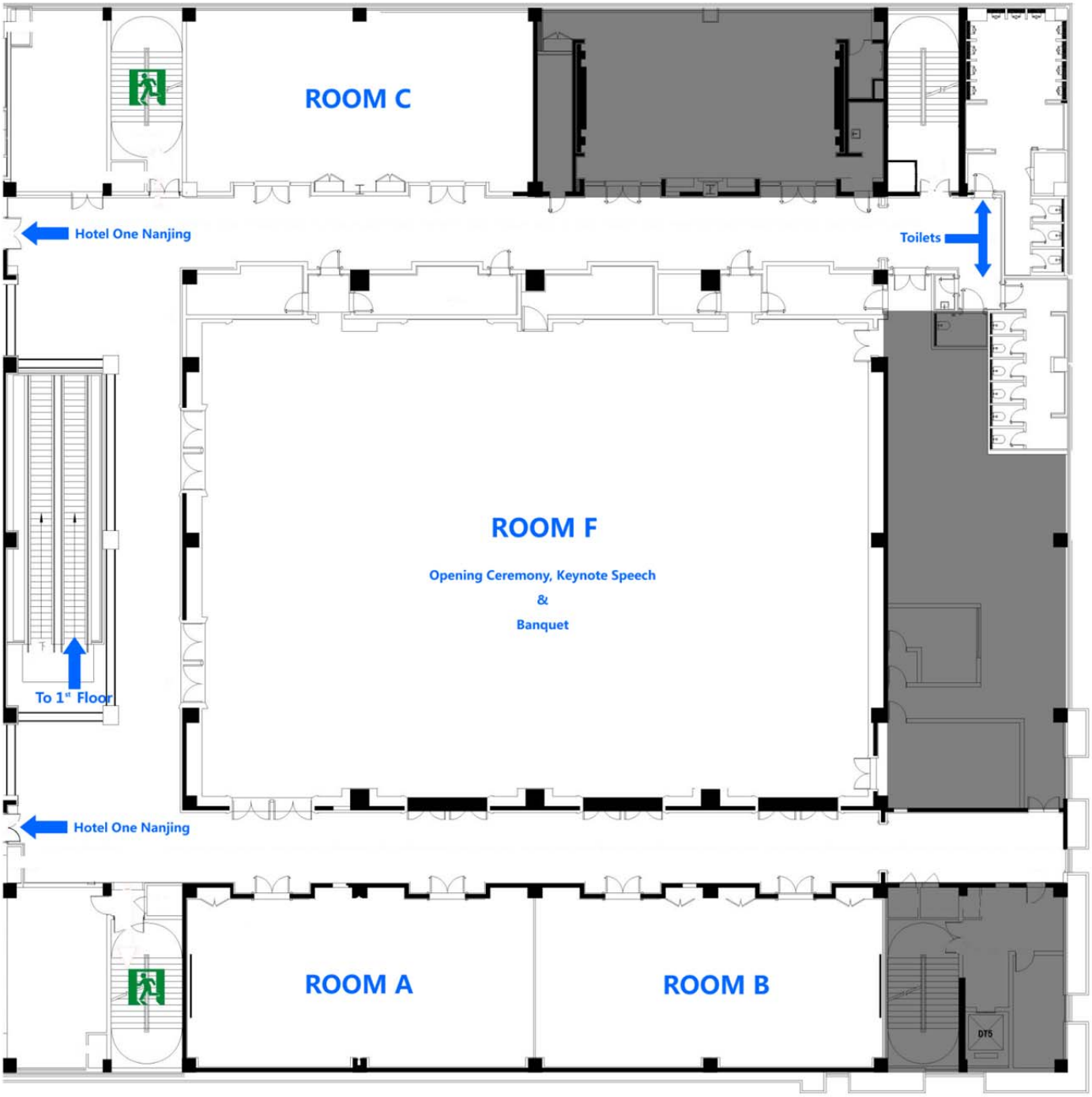
Note

Floorplan

1st Floor



2nd Floor


ROOM C
Hotel One Nanjing
Toilets
ROOM F
Opening Ceremony, Keynote Speech
&
Banquet
To 1st Floor
Hotel One Nanjing
ROOM A
ROOM B

Exhibitors List

Agilent Technologies Co., Ltd.
http://www.agilent.com

EM Software & Systems China
http://www.feko.info

Mitsubishi Electric & Electronics Co., LTD.
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Bluetest Inc.
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