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TECHNICAL PROGRAM DETAILS

Monday, December 12

08:00 - 09:00

REG1: Registration (08:00 – 15:00)

09:00 - 12:30

Tutorial 1 (PS Hall): Antennas for Software Defined Radio

Room: Ampangan I

SYNOPSIS

Software defined radio (SDR) and cognitive radio offer promise to give significant reductions in radio costs and increases in available capacity. This will be achieved by commoning of front end technology and antennas so that the the radio can be reconfigured solely through changes in software that can be done on-air. Cognitive radio, using SDR as an enabling technology will search for white spaces in the spectrum and reconfigure frequency and other parameters as appropriate. One of the primary challenges for antenna design thrown up by these new concepts is that, to achieve their full promise, the RF hardware will have to operate over more than a decade of bandwidth. It is very likely that only reconfigurable antennas will be able to meet this requirement in mobile terminals. This tutorial will give an overview of the state of the art in these two concepts taken from the antenna viewpoint. A review of antennas for both handsets and base stations, will be presented. New work in frequency reconfigurable antennas at the University of Birmingham will be highlighted.

Tutorial 2 (Peter Gardner): Microwave Circuits: Principles and Examples

Room: Ampangan II

SYNOPSIS

The tutorial is designed for people who are relatively new to microwave circuit analysis who wish to gain broad knowledge of some of the fundamentals, backed up by examples of current relevance. It will also be suitable for more experienced engineers or researchers seeking a brief refresher or an opportunity to gain a new perspective. The tutorial material will include examples using AWR Microwave Office™ software. Delegates are encouraged to register beforehand for a thirty day evaluation licence for the software on their laptops so that they can engage interactively with the examples during the session. Topics to be covered will include: Linear microwave circuit analysis; planar transmission lines; matching network design; couplers; basic filters; linear amplifiers – gain, noise and stability; non-linear amplifiers – intermodulation and spectrum spreading; power amplifiers; amplifier linearisation and efficiency enhancement methods.

Tutorial 3 (Guy Vandebosch): Recent Challenges in Antenna Modeling, Design, and Measurement

Room: Ampangan III

SYNOPSIS

The antenna and radiation group of the Katholieke Universiteit Leuven (KUL) is active in all aspects of antennas. The background of the group ranges from theory, modeling, and software development, over design and prototyping, to measurement. In this presentation, we will discuss the recent research challenges that the group is involved in. We start with fundamental antenna theory development. The work at K.U. Leuven mainly focuses on the study of radiated and stored energies in radiating structures. This theory will be applied to small antennas, which yields state-of-the-art results concerning the fundamental bounds on Q. Second, the long-term and strategic activity on antenna modeling and software development will be discussed. The in-house antenna software tool MAGMAS will be introduced. MAGMAS is Method of Moments tool that incorporates ca. 50 man years. It comes with a user-interface and is used within the group as a design and checking tool. It has proven to be highly competitive with the commercial solvers also available within the group. Third, several challenging strategic design lines will be treated. The first line is the realization of microsystems. Building on the theoretical background and on the knowledge of modeling and designing small antennas, it is very attractive to integrate such antennas in real microsystems: in this way very compact and high performance wireless modules at increasing frequencies become a reality. Various enabling technologies (integrated passives and RF MEMS technologies) for integrated antennas will be discussed through several examples that were developed in European research projects by KUL in close cooperation with IMEC (the Interuniversity Micro-Electronics Center in Belgium). Other important strategic antenna design research lines involve - the study of new architectures and concepts for electronic beam steering - the study of textile antennas to be integrated in clothing for WBAN - the study of RFID antennas - the study of energy harvesting antennas - the study of mm-wave antennas - the study of IR and optical nano-antennas, or nantennas. Fourth, the fabrication and measurement facilities available to the group and the challenges there for the future will be discussed.

12:30 - 14:15

BRK11: Afternoon Break

14:15 - 17:00

Tutorial 1 (cont) (PS Hall): Antennas for Software Defined Radio

Room: Ampangan I

Tutorial 2 (cont) (Peter Gardner): Microwave Circuits: Principles and Examples

Room: Ampangan II

Tutorial 3 (cont) (Guy Vandebosch): Recent Challenges in Antenna Modeling, Design, and Measurement

Room: Ampangan III

BRK12: Event Break

Tuesday, December 13

08:00 – 9:00

REG2: Registration (08:00 – 15:00)

09:30 – 10:20

Keynote Address 1 (Natalia K. Nikolova)

Microwave Near-Field Imaging Of Human Tissue: Hopes, Challenges, Outlook

Room: Ampangan I & II

SYNOPSIS

More than 40 years ago Larsen and Jacobi experimented with microwaves in the imaging of canine kidney. Their pioneering work triggered high hopes for a new diagnostic modality in medicine but also identified serious challenges. Research effort in this area continues unabated, focused especially on early-stage breast-cancer detection. The need for alternative cancer diagnostic tools is urgent and perceived worldwide as a high priority for research and development. Yet the very few clinical trials of experimental microwave imaging systems have not satisfied the requirements of today's medical diagnostics. This talk briefly reviews past and recent developments in near-field microwave methods for tissue imaging. In the context of these developments, the major challenges are discussed – challenges which have so far prevented microwave imaging from becoming a clinically viable modality. Promising new directions of research are described that have the potential to bring about a breakthrough. These include advances in hardware design and characterization (sensor arrays, custom and laboratory measurement instrumentation), methodologies for tissue-parameter characterization, and the development of data-processing and reconstruction algorithms. Many of these new developments draw upon recent successes of microwave and millimetre-wave imaging systems used for concealed-weapon detection, through-the-wall imaging and underground surveillance. Thus it is shown how the ever expanding field of microwave imaging is converging to address some of society's most urgent needs.

10:20 – 10:40

BRK21: Morning Break

10:40 – 11:30

Keynote Address 2 (Stepan Lucyszyn):

Commercial Applications for RF MEMS

Room: Ampangan I & II

SYNOPSIS

Radio frequency micro-electro-mechanical systems (RF MEMS) have been heralded as a technology fit for the 21st century, offering unsurpassed RF performance over more conventional solid-state electronic devices. In recent years, this technology has seen a rapid rate of expansion because of its potential for advancing new products within a broad range of applications; from ubiquitous smart sensor networks to mobile handsets. Indeed, within the US, Asia and Europe, R&D is almost at fever

pitch. The high levels of investment come second only to the expectations for commercial exploitation. The first RF MEMS device was reported 30 years ago by IBM. After experiencing the peak of inflated expectation in 2003 and subsequent trough of disillusionment in 2005, RF MEMS switches have emerged into the slope of enlightenment. They are now commercially available on the open market, offering new solutions for realizing high performance reconfigurable microwave circuits and systems. A major new book, entitled Advanced RF MEMS (edited by the speaker), is scheduled for publication at the beginning of 2010. This lecture will explain the many facets of this technology and demonstrate how RF MEMS can move itself out of the laboratory and into real commercial applications.

11:30 – 12:20

Keynote Address 3 (Manos M. Tentzeris): Inkjet-Printed Paper/Polymer-Based "Green" RFID and Wireless Sensor Nodes: The Final Step to Bridge Cognitive Intelligence, Nanotechnology and RF?
Room: Ampangan I & II

SYNOPSIS

In this talk, inkjet-printed flexible antennas, RF electronics and sensors fabricated on paper and other polymer (e.g. LCP) substrates are introduced as a system-level solution for ultra-low-cost mass production of UHF Radio Frequency Identification (RFID) Tags and Wireless Sensor Nodes (WSN) in an approach that could be easily extended to other microwave and wireless applications. The talk will cover examples from UHF up to the millimeter-wave frequency ranges. A compact inkjet-printed UHF "passive-RFID" antenna using the classic T-match approach and designed to match IC's complex impedance, is presented as a the first demonstrating prototype for this technology. Then, Prof. Tentzeris will briefly touch up the state-of-the-art area of fully-integrated wireless sensor modules on paper or flexible LCP and show the first ever 2D sensor integration with an RFID tag module on paper, as well as numerous 3D multilayer paper-based and LCP-based RF/microwave structures, that could potentially set the foundation for the truly convergent wireless sensor ad-hoc networks of the future with enhanced cognitive intelligence and "rugged" packaging. Prof. Tentzeris will discuss issues concerning the power sources of "near-perpetual" RF modules, including flexible miniaturized batteries as well as power-scavenging approaches involving thermal, EM, vibration and solar energy forms. The final step of the presentation will involve examples from wearable (e.g. bio-monitoring) antennas and RF modules, as well as the first examples of the integration of inkjet-printed nanotechnology-based (e.g. CNT) sensors on paper and organic substrates. It has to be noted that the talk will review and present challenges for inkjet-printed organic active and nonlinear devices as well as future directions in the area of environmentally-friendly ("green") RF electronics and "smart-skin" conformal sensors..

11:30 – 12:20

BRK22: Lunch Break

14:00 – 16:10

A11 : Electromagnetic Compatibility

Room : Rasah I

**Chairs: Farhana Ahmad Poad (Universiti Tun Hussein Onn Malaysia, Malaysia),
Idnin Pasya (University Teknologi MARA, Malaysia)**

14:20 Measurements and Reduction of Microwave Oven Electromagnetic Leakage ""3

N. Zin, M. Z. Mohd Jenu and F. Ahmad Po'ad

14:40 Direct Feed Biconical Antenna as a Reference Antenna ""7

S. Z. Sapuan, A. Kazemipour and M. Z. Mohd Jenu

15:00 Calculable Antenna Factor of a Biconical Reference Antenna ""4;

S. Z. Sapuan, A. Kazemipour and M. Z. Mohd Jenu

15:20 The Application of Wire Mesh Ground Plane in Open Area Test Site for Radiated Emission Measurement ""35

I. A. Wibowo, M. Z. Mohd Jenu, A. Kazemipour and A. F. Abdul Rahim

15:40 Harum Manis Mango Dielectric Properties Based on Maturity ""3;

K. Mohd Juni, M. F. Abd Malek, M. Ahmed and C. Meng

14:00 – 14:30

Invited Speaker 1 (Peter Gardner)

Linearity and Efficiency Enhancement Techniques in Microwave Transmitters ""43

Room : Ampangan I

SYNOPSIS

In microwave power amplifier (PA) design, high linearity is required in order to maintain the integrity of the amplified, modulated signals. High spectral efficiency in a communication signal can be achieved by the use of non-constant envelope modulations, which place particularly high demands on the PA linearity. High power efficiency is also increasingly important, given the drive to control CO₂ emissions and reduce energy consumption. Simple measures to improve linearity, such as operating a Class A amplifier well backed off from saturation, result in very poor efficiency. The trade-off between linearity and efficiency can be improved by adopting a more complex amplifier topology or incorporating the amplifier into a more complex transmitter architecture. This paper will present a review of existing and recently developed techniques for the enhancement of PA linearity and efficiency. It will explain the basic principles behind the techniques, provide comparisons of their relative advantages and disadvantages and discuss possible future directions.

Invited Speaker 2 (Jean-Charles Bolomey)
Scattering By Load-Modulated Antennas Background And Sensing Applications
Room : Ampangan II

SYNOPSIS

While transmitting and receiving properties of antennas are fully formulated and well understood, scattering issues remain more mysterious, even if they have been extensively exploited for a while in the antenna engineer practice for shaping radiation patterns, adjusting input impedances, or for characterization purposes. This presentation is more specifically focused on modulated scattering-based systems, which have been successfully developed during the last decades. Operating an antenna in a scattering mode allows avoiding any RF front-end, resulting in very simple and compact passive or battery-assisted transponders. These advantages are now widely exploited in low-cost RFID tags, as well as in low-invasive MST (Modulated Scatterer Technique) probes for EM-field measurements. This presentation consists of two major parts. The first one consists of a short tutorial review of the minimum engineering background required for a comprehensive approach to modulated scattering systems. Small antennas will be more particularly considered because low-invasiveness and high spatial resolution constitute significant advantages in many sensing applications. The power budget, a key issue for such systems, is derived from a very simple reciprocity-based formulation. The advantage of this analytical formulation is to apply, whatever the distance, for arbitrarily complex scenarios. In addition, the influence of various parameters can be clearly identified, paving the way for optimizing the antenna design in terms of global system performance. Examples of both active and passive scatterers illustrate the efficiency of this approach. The second part is more speculative and aims to identify transfer opportunities between RFID's and MST technologies for sensing applications. As compared to existing MST probes, passive RFID tags offer, at a glance, the indisputable advantage of being modulated from their own, without any wire or fiber. However, they may suffer autonomy/life time limitations and are constrained by standard regulations in terms of frequency range and power level. Furthermore, they exhibit specific technical difficulties, such as non-linearity of the IC chips loading the antenna. Various solutions to these drawbacks are addressed. Focusing on the case of systems involving arrays of modulated scatterers for its growing relevance in rapid imaging and wireless sensing (e.g. antenna measurement, industrial testing, medical diagnostic...), it is explained how the architecture of MST systems has conceptually changed during the last decades, primarily to face the critical sensitivity issue. Extrapolating such an evolution suggests promising solutions based on either RFID-derived or breakthrough technologies. To conclude, it is remembered that, while microwaves suffer no competition in the field of communications, they are loosing this comfortable privilege for Industrial Scientific Medical (ISM) applications where they must compete with many other efficient and already well-established modalities. In this competition, new modulated scattering technologies are reasonably expected contributing to valorize the specific advantages already recognized to RF- and microwave-based sensing modalities.

Invited Speaker 3: Per-Simon Kildal
Fast and Cost-Effective OTA-MIMO Measurements in Reverberation Chamber
Room : Labu

SYNOPSIS

The reverberation chamber has during the last 10 years been developed into a fast, accurate and cost effective instrument for emulating rich isotropic multipath and thereby characterizing small antennas and wireless terminals Over-The-Air (OTA) during fading. The lecture will explain how the chamber works, and give formulas for the average transfer function as well as the uncertainty by which we can

measure efficiency, diversity gain, maximum available MIMO capacity, total radiated power and receiver sensitivity. The latter can be obtained both as total isotropic sensitivity (TIS) and average fading sensitivity (AFS), the latter measured during continuous fading. The last part of the lecture will be devoted to throughput measurements of complete systems with MIMO capability, such as for WLAN 802.11n, LTE and WiMAX. The lecture will also explain how the time and frequency domain characteristics of the chamber (Doppler spread, time delay spread, coherence bandwidth) can be determined, and controlled to become similar to those in real-life environments. The lecture will also describe why the rich isotropic environment with Rayleigh fading is representative also for characterizing performance in non-rich multipath environments, even with the presence of Line-Of-Sight (LOS), when the statistics of the user is taken into account. This corresponds to Rician fading with a statistical Rician K-factor, and it will be shown how this converges to Rayleigh fading in the ergodic sense.

14:30 – 16:10

B11: Active and Passive Microwave Devices 1

Room : Ampangan I

Chairs: Zahriladha Zakaria (FKEKK, Universiti Teknikal Malaysia Melaka, Malaysia), Badrul Hisham Ahmad (Universiti Teknikal Malaysia, Malaysia)

14:30 **Tuning Circuit Based on Varactor for Tunable Filter ""48**

M. A. Abdul Latip and M. K. Mohd Salleh, N. Ab Wahab

15:10 **Miniaturized Multiband Matched Band-Stop Filter ""4;**

B. A. Adoum and P. W. Wong

15:30 **Wideband Local Oscillator Design for Wideband Transceivers ""55**

M. Naik and C. Vithalani

15:50 **Dual-path Fourth-Order Microstrip Coupled Lines Filter for Wideband Applications ""59**

S. A. Nordin, M. K. Mohd Salleh, M. K. Khalid and N. Othman

C11: Radar and Satellite Technology

Room : Ampangan II

Chairs: Mazlan Hashim (Prof, Malaysia), Azita Laily Yusof (Universiti Teknologi Mara, Malaysia)

14:50 **Accuracy of Data Acquisition Approaches with Ground Penetrating Radar for Subsurface Utility Mapping ""62**

S. W. Jaw and M. Hashim

15:10 **Development of a High Precision Timing and Control Unit for Synthetic Aperture Radar ""67**

H. Boey, T. S. Lim, V. C. Koo and F. Kung

15:30 **Design and Simulation of Beam Forming Network for TACAN Radar ""6;**

M. Hadeii, A. Ghorbani and S. M. Nargesi Khorramabad

15:50 Detecting the Occurrence of Ground ULF Electromagnetic Signal Prior to Earthquake Events ""76

N. Ya'acob, M. Abdullah , A. L. Yusof, M. T. Ali, , A. Idris and M. S. Samsudin

D11: Radio Propagation and Antennas 1

Room : Labu

Chairs: Varun Jeoti (University Teknologi PETRONAS, Malaysia), Muhammad Ramlee Kamarudin (Universiti Teknologi Malaysia, Malaysia)

15:10 Design and Analysis of a Multiband Koch Fractal Monopole Antenna ""7:

I. Adam, P. J. Soh, R.Hadibah and G. Vandenbosch

15:30 Compact and Wideband Wide-Slot Antenna for Microwave Imaging System ""85

S. S. Tiang, M. F. Ain and M. Z. Abdullah

15:50 A Split Step Wavelet Method for Radiowave Propagation Modelling in Tropospheric Ducts ""89

A. Iqbal and V. Jeoti

16:10 – 16:20

BRK23: Afternoon Break

16:20 – 18:00

A12: Microwave Testing and Sensors

Room : Rasah 1

Chairs: Farhana Ahmad Poad (Universiti Tun Hussein Onn Malaysia, Malaysia), Idnin Pasya (University Teknologi MARA, Malaysia)

16:40 Free-Space Microwave Measurement of Permittivity of Epitaxial Layer Semiconductor""93

F.A. Md. Zaki, Z. Awang, N. Baba, A. S. Zoolfakar, R. A. Bakar, M. Zolkapli, and N. Fadzlina

17:00 A Free-Space Method for S-Parameter Measurement of Semiconductor Materials At Microwave Frequencies ""97

F.A. Md. Zaki, Z. Awang, N. Baba, A. S. Zoolfakar, R. A. Bakar, M. Zolkapli, and N. Fadzlina

17:20 Energy-Efficient Clustering Scheme with Concentric Hierarchy ""9;

S. Jang, H. Y. Kim, N. U. Kim and T. M. Chung

- 17:40 **Simulation of Microwave Non Destructive Testing Environment (MNDT) in Determining the Dielectric Constant of Concrete Using Waveguide Port Approximation At 8-12GHz (X-Band) ""; 5**
H. Saad, H. A. Rahman, N. F. Naim, M. H. M. Nasir, I. Pasya and Z. Awang

B12: Active and Passive Microwave Devices 2

Room : Ampangan I

**Chairs: Badrul Hisham Ahmad (Universiti Teknikal Malaysia, Malaysia),
Zahriladha Zakaria (Universiti Teknikal Malaysia Melaka, Malaysia)**

- 16:20 **Design of SIW Bandpass Filter with 6 dB Offset ""; 9**
Z. Zakaria and B. H. Ahmad
- 16:40 **Design and Analysis of Broadband High Isolation of Discrete Packaged PIN Diode ""; 3
SPDT Switch for Wireless Data Communication**
N. A. Shairi, B. H. Ahmad and A. Chow Zha Khang
- 17:00 **Single-Mode Ring Resonator for Microwave Bandpass Filter Applications ""; 7**
N. Ab Wahab, M. K. Mohd Salleh, Z. Awang and Z. Ismail Khan
- 17:40 **High Directivity Microstrip Coupler with Single Slot of Unequal Length for GSM Dual Band ""; ;**
M. Shanmugam and T. Jayanthi

C12: Wireless and Cellular Communications 1

Room : Ampangan II

**Chairs: Mazlan Hashim (Prof, Malaysia)
Azita Laily Yusof (Universiti Teknologi Mara, Malaysia)**

- 16:20 **Reconfiguring Software Defined Radio Platform for Dynamic Spectrum Access ""325**
M. A. Sarijari, R. A. Rashid, N. Fisal, N. M. Abdul Latiff, S. K. Syed Yusof and K. M. Khairul Rashid
- 16:40 **CDMA450 Indoor Coverage Enhancement ""329**
A. S. Mohd Marzuki, S. Selamat, A. T. Md Azlan Tee, A. R. Abdul Rahim, K. Khalil and A. Naemat
- 17:00 **Spectrum Occupancy At UHF TV Band for Cognitive Radio Applications ""333**
M. R. Dzulkifli, M. R. Kamarudin and T. Abdul Rahman
- 17:20 **Experimental Verification of Multi-Layer Coconut Shell-Derived Microwave Absorbers ""337**
M. K. Mohd Salleh, M. Yahya, Z. Awang, W.N.W. Muhamad, A. M. Mozi, and N. Yaakob
- 17:40 **Traffic Driven Handoff Management Scheme in Next Generation Cellular Network ""33;**
A. L. Yusof, N. Ya'acob, M. T. Ali, and S. S. Sarnin

D12: Radio Propagation and Antennas 2

Room : Labu

**Chairs : Varun Jeoti (University Teknologi PETRONAS, Malaysia),
Muhammad Ramlee Kamarudin (Universiti Teknologi Malaysia, Malaysia)**

16:20 **Design & Development of High Gain Antenna Arrays for CDMA 450 ""345**

A. Asrokin, A. Abas, R. H. Basri and N. Jamlus

16:40 **Design and Realization of Rectangular Reconfigurable Antenna (RRA) for Airborne
RADAR ""349**

D. Ramakrishna, V. M. Pandharipande and M. Muthukumar

17:00 **Design and Evaluation of Flexible CPW-fed Ultrawide Band (UWB) Textile Antennas ""355**

P. J. Soh, G. A.E Vandenbosch and J. Higuera-Oro

17:20 **A Single Band Dual-Fed Circular Polarization Microstrip Antenna for RFID
Application ""359**

M. I. Sabran, S. K. A. Rahim, M. S. Abdul Rani and M. Z. Muhammad Nor

18:00 – 20:00

BRK24: Event Break

20:00 – 22:00

DINNER: GALA DINNER

Wednesday, December 14

08:00 – 8:20

REG3: Registration

8:20 – 8:50

Invited Speaker 4: Guy A. E. Vadenbosch

Integral Equation Techniques: from Microwaves, Over Mm-waves, to IR and Optical Frequencies "388

Room : Ampangan I

SYNOPSIS

Computational electromagnetics has become a real cornerstone in the design of microwave and millimeter wave components and systems. One of the major computational techniques used in these designs is to solve integral equations with the Method of Moments (MoM). Traditionally, MoM has been used extensively for antennas, transmission lines, filters, couplers, etc., mainly in the MHz and GHz range. However, MoM can also be applied at much higher frequencies. It will be shown that at these frequencies, this computational technique is just emerging. One of the reasons is that there are serious differences with the classical implementations, which prohibits the direct use of the well-known commercially available MoM solvers. For example, one of the differences is the fact that the concept of a surface current, confined to a very thin layer at the surface of a conductor, is not valid anymore. In this presentation, the different computational techniques will be reviewed and compared, not only in the traditional microwave and millimeter wave range, but especially at THz, IR, and optical frequencies. In concreto, the MAGMAS MoM solver will be compared to a numerical FDTD solver well-known in the plasmonics research community: Lumerical. It will be shown that also at these very high frequencies, MoM has its proper place in the pallet of computational algorithms.

Invited Speaker 5: Charles Bunting

Operational Process for Characterizing Below Deck Electromagnetic Compatibility

Room : Ampangan II "393

SYNOPSIS

Several test facility options for conducting electromagnetic compatibility testing including immunity, emissions, and shielding effectiveness are available. Generally each facility provides a different test electromagnetic environment. A reverberation chamber is a cavity enclosed by conducting surfaces with a method of exciting modal structure changes within the cavity. The test electromagnetic environment, a superposition of plane waves with random phase, results from repeated reflections from the conducting surfaces. The statistical isotropy, random polarization, and uniform electromagnetic environment of a reverberation chamber permit a robust, all aspect angle test without the requirement for rotation or translation of the equipment-under-test. The reverberation chamber electromagnetic environment provides the correct emulation of the equipment-under-test performance when it

operates in a cavity. Many standards permit the use of reverberation chambers as an alternate method for certification. As with every electromagnetic compatibility test technique, reverberation chambers are not a panacea and have disadvantages as well as advantages. This talk will provide a discussion of the reverberant electromagnetic environment, defining isotropy and uniformity and key statistical distributions of interest. The potential benefits of EMC testing in a reverberation chamber will be discussed. Finally, alternative applications of reverberation chambers will also be presented.

Invited Speaker 6: P S Hall

Antennas for Software Defined Radio Handsets ""397

Room : Labu

SYNOPSIS

Software defined radio is a relatively new concept in which radio transceivers have functionality that is primarily controlled by software. This implies that the waveform can be changed to suit any particular circumstance, and this means that the radio can be used in many more applications than currently or adapt to changing bands and signal type as new specifications arise. The word waveform includes, in more traditional terms, modulation, bandwidth and frequency. The implications for antennas are largely contained in the last two parameters, because it means that the antenna must be able to operate over a frequency range that is very much wider than conventionally considered, and possibly have bandwidth control. These two requirements are both very difficult to achieve in radio handsets. The development of these trends will be described, together with research performed to date to meet these needs, and conclusions drawn on future antennas.

08:20 – 10:30

A21: Active and Passive Microwave Devices 3

Room : Rasah I

Chairs: Reza Safian (Isfahan University of Technology, Iran),

Mohd Khairul Mohd Salleh (Universiti Teknologi MARA (UITM), Malaysia)

08:20 Design and Implementation of a Multi Triangular Microstrip Resonator Passband Filter Based on Mixed Coupling ""363

M. Hedayati, M. J. Kazemi and R. Safian

08:40 Readability of Amplitude Modulation (AM) Detector Laboratory Sheet ""367

M. F. Hussin and H. Yon

09:00 Error Vector Magnitude Analysis for Wideband QPSK and QAM Six-Port Modulator ""36;

R. Che Yob, N. Seman and S. N. A. Mohamed Ghazali

09:20 Compact Cascaded Quadruplet Bandpass Filter (CQBPF) using Folded Loop Resonator ""376 with Via-Hole

T. H. Lee, J. W. Baik, K. J. Lee and Y. S. Kim

09:40 **The Performance Comparison of Printed Dipole Antenna with Two Different Structures of AMC Ground Plane ""379**

M. Abu, M. K. A. Rahim, M. K. Suaidi, I. Mohd Ibrahim and N. Md. Nor

10:00 **Design and Cross-Section Analysis of Wideband Rectangular-Shaped Directional Coupler ""383**

S. N. A. Mohamed Ghazali, N. Seman, R. Che Yob, M. K. A. Rahim and S. K. A. Rahim

8:50 – 10:30

B21: Computational Electromagnetics and Electromagnetic Modeling 1

Room : Ampangan I

**Chairs: Ahmad Fadzil Ismail (IIUM, Malaysia),
Franklin Joseph (Royal Malaysian navy & IEEE, Malaysia)**

08:50 **An Investigation of Electromagnetic Field Effect on a Human Skin Cell Using Numerical Method Approaches ""39:**

M. M. Ismail, M. N. Shah Zainudin, R. A. Rahim, M. Alice, N. H. Kassim

09:10 **Spatial Stability Analysis for the Geodesic FDTD Algorithm ""3: 5**

Yi Wang, Q. Cao and B. Su

09:30 **Binomial Multi-Layer Coconut Shell-Based Rubber Microwave Absorber Design ""3: 9**

M. K. M. Salleh, M. Yahya, Z. Awang, W. N. W. Muhamad, A. M. Mozi and N. Yaacob

09:50 **Ground Penetrating Radar Data Processing for Retrieval of Utility Material Types and Radius Estimation ""3; 3**

M. Hashim, S. W. Jaw and M. Marghany

C21: Radio Propagation and Antennas 3

Room : Ampangan II

Chairs: Mohd Haizal Jamaluddin (Universiti Teknologi Malaysia, Malaysia), Noor Hasimah Baba (Universiti Teknologi Mara Malaysia, Malaysia)

09:10 **H-Shaped Slot Microstrip Reflectarray Antenna 3; 9**

N. I. Dzulkipli, M. H. Jamaluddin and H. A. Hasnan

09:30 **A Wideband UHF RFID Reader Antenna 423**

J. J. Tiang, M. T. Islam, N. Misran, J. S. Mandeep and C. L. Choo

09:50 **Design of a Ridged Waveguide Slot Antenna for Millimeterwave Applications ""427**

N. A. Murad and R. F. Raja Suleiman

D21: Radio Propagation and Antennas 5

Room : Labu

Chairs : Suhaila Subahir (Universiti Teknologi MARA, Malaysia)

- 08:50 **A Dual-Band Printed Zigzag Antenna with Two Different Bend Angles ""42;**
A. Ghobadi and M. Dehmollaian
- 09:10 **A Dual Frequency Microstrip Patch Antenna for GPS and WiMAX Application ""435**
S. Subahir, N. A. Wahab and W. N. W. Muhammad
- 09:30 **Printed Dipole with Slot EBG Structures with Artificial Magnetic Conductor and Band-Notched Behaviours ""439**
K. Kamardin, M. K. A. Rahim, P. S Hall, N. A. Samsuri and N. A. Elias
- 09:50 **Inductance Loaded Circular Patch Antenna for Switchable Circularly Polarization ""445**
K. J. Lee, T. H. Lee, J. W. Baik and Y. S. Kim

10:30 – 10:40

BRK31: Morning Break

10:40 – 13:00

A22: Active and Passive Microwave Devices 4

Room : Rasah 1

Chairs : Reza Safian (Isfahan University of Technology, Iran), Mohd Khairul Mohd Salleh (Universiti Teknologi MARA (UITM), Malaysia)

- 10:40 **A Microstrip Diplexer Using Folded Hairpins ""448**
T. Sie King, A. T. Ying Ying and Su Hieng Tiong
- 11:00 **Reconfigurable Matched Bandstop Filter ""452**
M. K. Zahari , B. H. Ahmad, P. W. Wong and N. A. Shairi
- 11:20 **The Investigation of PIN Diode Switch on Reconfigurable Antenna ""456**
M. F. Ismail, M. K. A. Rahim and H. A. Majid
- 11:40 **SPDT Switch with Defected Ground Structure for Time Division Duplex Switching in Wireless Data Communication System ""45:**
N. A. Shairi, B. H. Ahmad, M. Z. A. Aziz and A. F. Osman
- 12:00 **Quasi-Elliptic Triple-Mode Filter ""464**
S. Cheab and P. W. Wong

- 12:20 **The Design of 5 dB Attenuator in Coplanar Waveguide for DC to 67 GHz** ""468
A. Muhammad Afifi and A. Thajuddin

B22: Computational Electromagnetics and Electromagnetic Modeling 2

Room : Ampangan 1

**Chairs: Ahmad Fadzil Ismail (IIUM, Malaysia),
Franklin Joseph (Royal Malaysian navy & IEEE, Malaysia)**

- 10:40 **Low Cost Hybrid RF-FSO to Reduce Rain Effect in Tropical Region** ""472
M. Yahya, K. Salleh, N. A. Mohd Akib, S. A. F. Jamalullail and Z. Awang
- 11:00 **Investigation on the Performance of Pre- and Post Compensation Using Multi-Channel CFBG Dispersion Compensators** ""476
K. Khairi, Z. Lambak, N. Md Samsuri, Z. Hamzah and F. Kok Hann
- 11:20 **Analysis of Mushroom-like Electromagnetic Band Gap Structure Using Suspended Transmission Line Technique** ""47:
O. Ayop and M. K. A. Rahim
- 11:40 **Transmit Optics Analysis for Free Space Optics Improvements** ""484
M. Yahya, K. Salleh and Z. Awang
- 12:00 **Performance Evaluation of Global and Absolute DEMs Generated From ASTER Stereo Imagery** ""488
K. Rokni, M. Marghany, M. Hashim and S. Hazini
- 12:20 **Empirical Conversion of Rainfall Rate Distribution for Various Integration Times in Malaysia** ""492
A. F. Ismail, W. Hashim, K. Abdullah and N.A. Malik

C22: Radio Propagation and Antennas 4

Room : Ampangan II

Chairs: Mohd Haizal Jamaluddin (Universiti Teknologi Malaysia, Malaysia), Noor Hasimah Baba (Universiti Teknologi Mara Malaysia, Malaysia)

- 10:40 **Implementation Model of Rectangular Microstrip Antenna with Multilayer Air Gap** ""496
K. Budayawan, M. Isa, A. Ismail and R. S. Azmir
- 11:40 **Planar Ultra-wideband Monopole Antenna with Band-Notch Performance** ""4: 4
E. Sarbazi, M. H. Mirmozafari, A. Ghobadi, R. Shayanfar and B. Yousefi Darani

- 12:20 **Conversion of 15-Minutes to 1-Minute Rain Attenuation Derived From Tropical Rain Attenuation Measurement "49:**
K. AlKhedhairi and J. Din

D22: Radio Propagation and Antennas 6
Room : Labu
Chairs: Suhaila Subahir (Universiti Teknologi MARA, Malaysia)

- 10:40 **Reconfigurable Wide to Narrow Band Antenna for Cognitive Radio Systems ""4: 7**
H. A. Majid, M. K. A. Rahim, M. Hamid and M. F. Ismail
- 11:20 **Design of a Triple-Band h Slot Patch Antenna ""4: ;**
O. Noori, J. Chebil, Md Islam and S. Khan
- 11:40 **Design of a Passive RFID Tag Antenna At 2.45 GHz for Mounting on Various Platforms ""4; 5**
Md Islam, A. Yussuf, A. Z. Alam, A. F. Ismail, J. Chebil and S. Khan
- 12:00 **Preliminary Analysis of ITU-R Rain Attenuation Time Series Synthesizers in Equatorial Kuala Lumpur ""4; :**
L. Hong Yin, L. Luini, J. Din, A. Panagopoulos and C. Capsoni

13:00 – 14:00

BRK32: Lunch Break

14:00 – 16:00

A31: Advanced Materials, Millimetre-waves and Photonics
Room : Rasah 1
Chairs: Chen-Ming Li (Industrial Technology Research Institute (ITRI), Taiwan), Rabi Yousif (Curtin University of Technology, Malaysia)

- 14:40 **Effects of Annealing Temperature on RF Behaviour of Mg_{0.2}Zn_{0.8}O Thin Films ""525**
R. Ahmad, H. Nadzar, A. Teh, M. Kara, Z. Awang, M. Salina, M. H. Mamat and M. Rusop
- 15:20 **Evaluation of Mode Filter in Optical Splitter by Using Method of Lines ""529**
Z. Lambak, K. Khairi, Z. Hamzah and F. Kok Hann
- 15:40 **Compact and Embroidered Textile Wearable Antenna ""533**
M. Osman, M. K. A. Rahim, N. A. Samsuri and M. Ali

B31: Wireless and Cellular Communications 2

Room : Ampangan I

**Chairs: Rongrong Shang (Nokia Siemens Networks, P.R. China)
Norsuzila Ya'acob (Universiti Teknologi Mara, Malaysia)**

- 14:00 **Analysis and Test for Co-site of LTE and WiFi System ""537**
R. Shang and X. Wang
- 14:20 **An FPGA Implementation of Shift Converter Block Technique on FIFO for UART ""542**
N. Jusoh, A. Ibrahim, M. A. Haron and F. Sulaiman
- 14:40 **The 750MHz Transmitter Design for 2X2 MIMO-OFDM Application ""547**
A. R. Abdul Rahim, A. Man, M. F. Hashim and Z. Mohd Yusof
- 15:00 **Design an Implantable Antenna At 2.45GHz for Wireless Implantable Body Area ""54;**
Network (WiBAN) Applications
N. H. Ramli, E.N. Ahyat, M. R. Kamarudin and N.A. Samsuri
- 15:20 **Time-Varying Infostation Channel Characterization ""555**
U. Okonkwo, R. Ngah, T. Abdul Rahman, C. Chude and T. Prokoso

C31: RF/Microwave Integrated Circuits, MEMS & Nanotechnology 1

Room : Ampangan II

**Chairs: Ali Fotowat-Ahmady (Sharif University of Technology, Iran), Corrado Florian
(University of Bologna, Italy)**

- 14:00 **UHF Class-4 Active Two-Way RFID Tag for a Hybrid RFID-Based System ""559**
G. Jadhav and S. Hamedi-Hagh
- 14:20 **Low Phase Noise Oscillator Topologies: Theory and Application to MMIC VCOs ""565**
R. Cignani, C. Florian, F. Filicori and G. Vannini
- 14:40 **Design of L and X Band Class E Power Amplifiers with GaAs pHEMT Technology for
Space SAR ""569**
C. Florian, R. Paganelli, A. Musio, F. Scappaviva and M. Feudale
- 15:00 **Low Actuation Voltage RF MEMS Switch for WiMAX Applications ""573**
B. Yousefi Darani, E. Abbaspour Sani, R. Shayanfar, A. Shams and M. H. Mirmozafari
- 15:20 **A 3-10 GHz Low Power Ultra-Wideband CMOS LNA ""578**
P. H. Chen and J. R. Yang

- 15:40 **Gas Flow Rate and Synthesis Time Dependence of MWCNT Growth by Chemical Vapour Deposition ""57;**
M. Kara, A. Teh, R. Ahmad, M. Rusop and Z. Awang

D31: Radio Propagation and Antennas 7

Room : Labu

**Chairs: Fauziahanim Che Seman (Universiti Tun Hussein Onn Malaysia, Malaysia),
Mohd Tarmizi Ali (Universiti Teknologi Mara, Malaysia)**

- 14:00 **Arrays of Patch Antenna Using Log Periodic Property""585**
M. Dadel and S. Srivastava

- 14:20 **X-Polarization Array Antenna with Parallel Feeding for WiMAX 3.55 GHz Application ""58:**
R. Dewan, S. K. A. Rahim, S. F. Ausordin, H. Iddi and M. Z. A. Aziz

- 14:40 **Phase Characterisation in Salisbury Screen Absorber At Oblique Incidence ""595**
F. Che Seman and R. Cahill

- 15:00 **A Novel Compact Reconfigurable Multi-Band Antenna ""599**
M. Jusoh, F. Jamlos, M. R. Kamarudin and M. F. Malek

- 15:20 **Improved Radiation Characteristics of a Patch Antenna with Square Slot EBG ""5: 3**
G. Gnanagurunathan and S. Krishnasamy T.

- 15:40 **An Evaluation of Half-Cut Technique for Microwave-Photonic Access-Point Antenna Miniaturization ""5: 6**
T. Prakoso, R. Ngah, T. Abdul Rahman, U. Okonkwo and Z. Ghassemlooy

16:00 – 16:10

BRK33: Afternoon Break

16:10 – 17:50

A32: Biological Effects and Medical Applications

Room : Rasah 1

**Chairs: Chen-Ming Li (Industrial Technology Research Institute (ITRI), Taiwan),
Rabi Yousif (Curtin University of Technology, Malaysia)**

- 16:10 **The Effects of Straight-Pin Type Earring Worn on the Head on SAR At 2.4 GHz and 5.8 GHz ""5: ;**
M. Z. Anuar, N. A. Samsuri, M. K. A. Rahim, N. Othman and F. Zubir

16:30 **Dielectric Properties of Slaughtered and Non-Slaughtered Goat Meat** ""5; 5
A. Mohiri, Z. Burhanudin and I. Ismail

17:30 **Design and Analysis of Dual Segments Two Element Array Antenna for Wideband Applications** ""5; :
M. Ain, U. Ullah, A. A. Sulaiman, M. A. Othman, Y.M.Qasaymeh, Z. A. Ahmad and Sabar Derita Hutagalung

B32: Wireless and Cellular Communications 3

Room : Ampangan I

Chairs: Rongrong Shang (Nokia Siemens Networks, P.R. China), Norsuzila Ya'acob (Universiti Teknologi Mara, Malaysia)

16:10 **A Low-Cost Pulse Generator for DS-UWB Applications** ""625
R. Thai Singama, Marc PIETTE and Frédéric DU-BURCK

16:30 **Prototype of Quadrature Amplitude Modulation (QAM) Baseband Modem for a Digital Baseband Signal Processor** ""629
R. Mohamad, R. Mahmud and R. A. Awang

16:50 **Lee's Path Loss Model Calibration and Prediction for Jiza Town, South of Amman City, Jordan at 900 MHz** ""634
L. Nissirat, M. Ismail, M. Nisirat and M. Singh

C32: RF/Microwave Integrated Circuits, MEMS & Nanotechnology 2

Room : Ampangan II

Chairs: Corrado Florian (University of Bologna, Italy), Ali Fotowat-Ahmady (Sharif University of Technology, Iran)

16:10 **A Low-Power Current Reuse CMOS RF Front-End for GPS Applications** ""638
H. Jalili and A. Fotowat-Ahmady

16:30 **RF Characterization of Mg_{0.2}Zn_{0.8}O Thin Film Capacitors for MMIC Applications** ""642
R. Ahmad, M. Salina, S. Sulaiman, A. Awang Teh, M. Kara, M. Rusop and Z. Awang

16:50 **Effect of Metallization on RF Properties of PZT-Based Transmission Lines** ""646
H. Muhamed Nadzar, S. Sulaiman, M. K. Mohd Salleh and Z. Awang

- 17:10 **Design of Bow Tie Antenna in CST Studio Suite Below 2GHz for Ground Penetrating Radar Applications**""652
M. Roslee, K. S. Subari and I. S. Shahdan

D32: Radio Propagation and Antennas 8

Room : Labu

**Chairs: Fauziahanim Che Seman (Universiti Tun Hussein Onn Malaysia, Malaysia),
Mohd Tarmizi Ali (Universiti Teknologi Mara, Malaysia)**

- 16:10 **Frequency Reconfigurable Quasi-Yagi Microstrip Antenna with Beam Shaping for WiMAX Application** ""656
M. T. Ali, M. Y. Mat Zain, N. Ramli, A. L. Yusof, and M. N. Md Tan
- 16:30 **E-Shape Microstrip Patch Antenna for Wideband Applications** ""65;
M. T. Ali, M. A. Sulaiman, I. Pasya, M. H. Mazlan Zaharuddin and N. Ya'acob
- 17:10 **Dual Band Double Stacked Dielectric Resonator Antenna with a P-Shape Parasitic Strip for Circular Polarization** ""666
A. Khalajmehrabadi, M. K. A. Rahim and M. Khalily
- 17:30 **A Compact Circularly Polarized and Wideband Rectangular Dielectric Resonator Antenna** ""66:
M. Khalily, M. K. A. Rahim, A. Khalajmehrabadi and M. R. Kamarudin

18:00

Event Ends