

Short Course Introduction at APMC2008

By Prof. Kin-Lu Wong

1. The course title:

Planar Antennas for Wireless Communications and Their Recent Advances

2. The course abstract:

Planar antennas, including printed antennas, metal-plate antennas, ceramic chip antennas, are generally flat in appearance and have a low profile. Such planar antennas have found extensive applications in WWAN (850/900/1800/1900/ 2050 MHz bands), WLAN (2.4/5.2/5.8 GHz bands), WiMAX (2.5/3.5/5.5 GHz bands), UWB (3.1~10.6 GHz band) systems, and other related communications systems. Many innovative planar antennas for related applications such as in the internal handset/laptop antennas, WLAN/WiMAX antennas, and UWB antennas have been reported recently. These recently developed planar antennas will be addressed. The SAR (specific absorption rate) and HAC (hearing aid compatibility) results of some promising internal handset antennas will also be discussed.

The topics for this short course will include:

(1) **Internal multiband handset/laptop antennas for WWAN systems**, including using the printed monopole ($\lambda/4$ and $\lambda/8$ mode excitation), PIFA ($\lambda/4$ and $\lambda/8$ mode excitation), loop (λ , $\lambda/2$ and $\lambda/4$ mode excitation) and slot ($\lambda/2$ and $\lambda/4$ mode excitation) antennas; the printed antennas can have a very small size for penta-band WWAN operation and are suitable to be directly printed on the system circuit board of the mobile device, hence allowing the mobile device to have a very thin profile. The concept for EM compatible (EMC) internal mobile device antennas will also be introduced.

(2) **WLAN/WiMAX antennas**, including dual-band and/or diversity operations for mobile devices. Promising antennas with broadband CP (broadside and omnidirectional) radiation, high-gain omnidirectional radiation and diversity operation for access points are also presented.

(3) **UWB antennas for mobile devices and access points**, including the design techniques for UWB impedance matching, improved omnidirectionality, pattern stability, polarization purity and band-notching.

3. The course prerequisite:

For senior or graduate students or antenna engineers/scientists interested in wireless communication antenna design, especially for planar or internal antenna design for wireless communications applications.

4. The biography of the speaker:



Kin-Lu Wong (M'91, SM'97, F'07) received the B.S. degree in electrical engineering from National Taiwan University, Taipei, Taiwan, and the M.S. and Ph.D. degrees in electrical engineering from Texas Tech University, Lubbock, Texas, USA, in 1981, 1984, and 1986, respectively.

From 1986 to 1987, he was a visiting scientist with Max-Planck-Institute for Plasma Physics in Munich, Germany. Since 1987 he has been with the Department of Electrical Engineering, National Sun Yat-Sen University, Kaohsiung, Taiwan, where he became a Professor in 1991. From 1998 to 1999, he was a Visiting Scholar with the ElectroScience Laboratory, The Ohio State University, Columbus, Ohio, USA.

In 2005, Prof. Wong was elected to be Sun Yat-sen Chair Professor of National Sun Yat-Sen University. He also served as Chairman of the Electrical Engineering Department from 1994 to 1997, Dean of the Office of Research Affairs from 2005 to 2008, and now as Vice President for Academic Affairs, National Sun Yat-sen University (2007~).

Dr. Wong has published more than 440 refereed journal papers and 220 conference articles and has personally supervised 45 graduated PhDs. He also holds over 100 patents, including U.S., Taiwan, China and German patents, and has many patents pending. He is the author of *Design of Nonplanar Microstrip Antennas and Transmission Lines* (New York: Wiley, 1999), *Compact and Broadband Microstrip Antennas* (New York: Wiley, 2002), and *Planar Antennas for Wireless Communication* (New York: Wiley, 2003).

Dr. Wong is an IEEE Fellow and received the Outstanding Research Award three times from National Science Council of Taiwan in 1994, 2000 and 2002, and was elevated to be a Distinguished Research Fellow of National Science Council (NSC) of Taiwan in 2005. He also received the Outstanding Research Award from National Sun Yat-Sen University in 1994 and 2000, the ISI Citation Classic Award for a published paper highly cited in the field in 2001, the Outstanding Electrical Engineer Professor Award from Institute of Electrical Engineers of Taiwan in 2003, and the Outstanding Engineering Professor Award from Institute of Engineers of Taiwan in 2004.

Information provided by:

Kin-Lu Wong, IEEE Fellow

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5. Venue: Hong Kong Convention and Exhibition Center, Hong Kong

6. Time: 9:30am-12:30pm, December 16th, 2008.

7. Registration fee: HK\$1000

Short Course Introduction at APMC2008

By Prof. Atef Z. Elsherbeni

1. The course title:

Acceleration of the FDTD Technique for advanced applications

2. The course abstract:

This course will first provide an overview of the basic formulation of the Finite-Difference Time-Domain (FDTD) technique for printed antennas and microwave circuits. Then it will proceed with the presentation of several techniques aiming for the acceleration for the FDTD method. Among these techniques is the use of an efficient non-uniform discretization, the implementation of parallel FDTD to benefit from the multi-core processors, and the use of graphical processing units (GPU) rather than the traditional computer processor (CPU). Examples of printed antennas and microwave filters will be presented with MATLAB implementation details to illustrate the basic application and the acceleration techniques. The course will also show how the application of the accelerated FDTD technique can be used in various environments such as teaching, optimization, and research. Sample teaching examples based on GPU processing and MATLAB graphical interface will be illustrated and provided to the attendees.

3. The course prerequisite :

Knowledge of basics of electromagnetics

4. The biography of the speaker:

Dr. Atef Z. Elsherbeni is a Professor of Electrical Engineering, the director of The School of Engineering CAD Lab, and the associate director of The Center for Applied Electromagnetic Systems Research (CAESR) at The University of Mississippi. He is adjunct Professor, at The Department of Electrical Engineering and Computer Science of the L.C. Smith College of Engineering and Computer Science at Syracuse University. Dr. Elsherbeni has conducted research dealing with scattering and diffraction by dielectric and metal objects, finite difference time domain analysis of passive and active microwave devices including planar transmission lines, field visualization and software development for EM education, interactions of electromagnetic waves with human body, sensors development for monitoring soil moisture, airports noise levels, air quality including haze and humidity, reflector and printed antennas and antenna arrays for radars, UAV, and personal communication systems, antennas for wideband applications, and antenna and material properties measurements. He is the co-author of the book "The Finite Difference Time

Domain Method for Electromagnetics With MATLAB Simulations”, Scitech 2008, the book “Antenna Design and Visualization Using Matlab”, Scitech, 2006, the book “MATLAB Simulations for Radar Systems Design”, CRC Press, 2003, the book “Electromagnetic Scattering Using the Iterative Multiregion Technique”, Morgan & Claypool, 2007, the book “Electromagnetics and Antenna Optimization using Taguchi's Method”, Morgan & Claypool, 2007, and the main author of the chapters “Handheld Antennas” and “The Finite Difference Time Domain Technique for Microstrip Antennas” in Handbook of Antennas in Wireless Communications, CRC Press, 2001. Dr. Elsherbeni is a Fellow member of the Institute of Electrical and Electronics Engineers (IEEE) and a fellow member of The Applied Computational Electromagnetic Society (ACES). He is the Editor-in-Chief for ACES Journal and an Associate Editor to the Radio Science Journal.

5. Venue: Hong Kong Convention and Exhibition Center, Hong Kong
6. Time: 9:30am-12:30pm, December 16th, 2008.
7. Registration fee: HK\$1000

Short Course Introduction at APMC2008

By Prof. Jian-Ming Jin

1. The course title:

Finite Element Analysis of Complex Antennas and Arrays

2. The course abstract:

This short course covers both the basics and advanced topics. It is intended for people who have basic ideas about the finite element method, but want to learn more about its modeling of complex antennas and phased-array antennas. Advanced topics are included to show the potential and capability of the finite element method for antenna analysis. Application examples will be given during the discussion of each topic. The following topics will be included in this short course.

1. Finite Element Formulations in the Frequency and Time Domains
2. Modeling of Complex Dispersive Materials
3. Finite Element Mesh Truncation Techniques
 - 3.1 Absorbing Boundary Conditions
 - 3.2 Perfectly Matched Layers
 - 3.3 Boundary Integral Equations
4. Antenna Source Modeling and Parameter Calculation
 - 4.1 Current feed
 - 4.2 Voltage feed
 - 4.3 Waveguide feed
5. Infinite Phased-Array Modeling Via Floquet Theorem
 - 5.1 Frequency-domain approach
 - 5.2 Time-domain approach
6. Finite Phased-Array Modeling Via Domain Decomposition
 - 6.1 Frequency-domain approach
 - 6.2 Time-domain approach
7. Antenna-Platform Interaction Modeling
8. Application Examples and Numerical and Practical Considerations

Each attendee will receive a copy of the textbook “Finite Element Analysis of Antennas and Arrays” by J. M. Jin and D. J. Riley (Wiley, 2008; List price: \$115).

3. The course prerequisite :

Knowledge of basics of electromagnetics

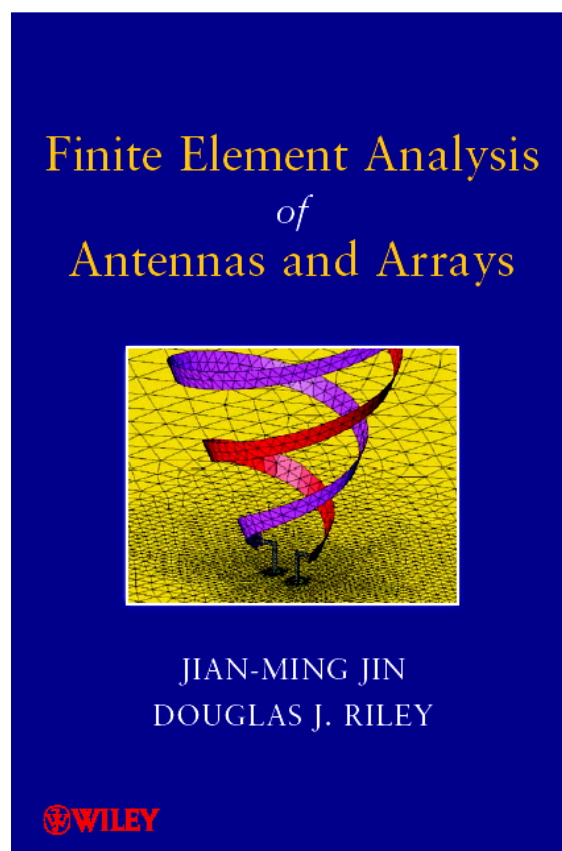
4. The biography of the speaker:

Jian-Ming Jin is a professor and Director of the Electromagnetics Laboratory and Center for Computational Electromagnetics at the University of Illinois at Urbana-Champaign. He authored *The Finite Element Method in Electromagnetics* and *Electromagnetic Analysis and Design in Magnetic Resonance Imaging*, coauthored *Computation of Special Functions* and *Finite Element Analysis of Antennas and Arrays*, and coedited *Fast and Efficient Algorithms in Computational Electromagnetics*. A Fellow of IEEE, he is listed by ISI among the world's most cited authors.

5. Venue: Hong Kong Convention and Exhibition Center, Hong Kong

6. Time: 9:30am-12:30pm, December 16th, 2008.

7. Registration fee: HK\$1500 (including a book with list price US\$115)



Short Course Introduction at APMC2008

By Prof. Raj Mittra

1. The course title:

[Small Antenna Design for UWB, Sensors, RFID tags and other Applications and their Performance Enhancement using EBG's and Metamaterials](#)

2. The course abstract:

Advent of new wireless devices and sensors have fueled a continuing trend toward the miniaturization of antenna size, and the challenges faced in designing these devices need to be met by innovations in antenna technology. As an example, modern cell phones routinely require antennas covering five bands or more, each band having stringent requirements with respect to bandwidth, efficiency and coupling. The design of such an antenna in a minimal space requires the right blend of high performance design strategies, appropriate simulation tools and adapted optimization schemes.

Recently, systems such as WiMAX, UWB, MIMO and RFID have instigated the development of new techniques for designing small antennas with enhanced performance. This workshop will focus on the design of small antennas for a wide variety of applications, including sensors, RFID and multiband antennas. State-of-the-art design solutions for practical applications will be presented, and practical issues such as integration of small antennas into their environment will be discussed.

Topics will include: Techniques for size reduction; bandwidth enhancement; multiband design; small antenna characterization; and optimization techniques. The use of metamaterials and EBG's to enhance their performance will also be discussed.

3. The course prerequisite:

Knowledge of basics of electromagnetics

4. The biography of the speaker:

Raj Mittra is Professor in the Electrical Engineering department of the Pennsylvania State University. He is also the Director of the Electromagnetic Communication Laboratory, which is affiliated with the Communication and Space Sciences Laboratory of the EE department. Prior to joining Penn State he was a Professor in Electrical and Computer Engineering at the University of Illinois in Urbana Champaign. He is a Life Fellow of the IEEE, a Past-President of AP-S, and he has served as the Editor of the Transactions of the Antennas and Propagation Society. He has been awarded the

Guggenheim Fellowship, the IEEE Centennial and Millennium Medals, the IEEE/AP-S Distinguished Achievement Award and the AP-S Chen-To Tai Distinguished Educator Award, and the Electromagnetics Award of the IEEE. He has over 1,000 publications to his credit, as well as more than 30 books or book chapters on electromagnetics, antennas, microwaves and electronic packaging.. He has supervised the completion of over 100 Ph.D. theses, an equal number of M.S. theses, and has mentored over 50 postdocs.

Raj is the President of RM Associates, which is a consulting organization that provides services to industrial and governmental organizations, both in the U. S. and abroad.

5. Venue: Hong Kong Convention and Exhibition Center, Hong Kong

6. Time: 9:30am-12:30pm, December 16th, 2008.

7. Registration fee: HK\$1000

Short Course Introduction at APMC2008

By Prof. Cheng P. Wen

1. The course title:

GaN HEMT – Emerging Polar Semiconductor Technology for Large-signal Microwave and Millimeter-wave Power Amplification.

2. The course abstract:

Unlike conventional semiconductors, electronic carriers originate predominantly from built-in electric dipoles in the III-nitride materials, an emerging family of polar semiconductors most promising for high power microwave signal amplification. Existing semiconductor device models and characterization techniques are found to be inadequate to deal with the peculiar nature of the polarization induced electron-hole charge pairs in polar semiconductor devices such as the GaN HEMT. The effects of device material parameters including layer composition, layer thickness, impurity concentration, and metal contacts on GaN HEMT electronics properties will be examined, based on energy band considerations. The misconception of using a single metal to make Ohmic contact to both electrons and holes is clarified. Experimental verification of the two-channel, two-carrier (2DEG channel electrons and barrier surface mobile holes) GaN HEMT model will also be presented. Emphasis will be placed on the relationship between transistor device design, and the electrical performance characteristics, especially in the area of device reliability including current collapse, and memory effect.

3. The course prerequisite :

Basic knowledge of semiconductor device physics and electronic material characterization techniques required. Familiar with high power microwave transistor performance requirements and limitations of solid-state devices highly desirable.

4. The biography of the speaker:

Cheng P. Wen, Ph. D., University of Michigan, Fellow of IEEE.

Visiting Professor, Institute of Microelectronics, Peking University, Beijing, China 100871. Formerly Chief Scientist at Hughes Aircraft Company, Section Head at Rockwell International, and Member of Technical Staff at RCA Laboratories.

More than 50 years of research experience in microwave devices, integrated circuits, subsystems, gas lasers, and acoustic devices. Inventor of Coplanar Waveguide (CPW), and pioneered the

development of CPW based, flip-chip microwave circuitry, and ultra-high power (30-watt) pulsed mm-wave (W-band) IMPATT diode technology. Inventor of MQW LWIR (10-micron) detector with intrinsic event discrimination capability. Invented a laser color switch, the first electronic mode selection scheme for lasers. Developed the lowest noise traveling-wave amplifier ever built.

Honors include: Trice recipient of RCA Laboratories Outstanding Achievement Award, recipient of 1995 IEEE MTTT Applications Award, 1997 Hughes Sensors and Electronics System Technical Excellence Award, Honorary Professor of Institute of Microelectronics, Chinese Academy of Science, inducted into the Microwave Hall of Fame.

Publications: 46 issued U. S. Patents, over 50 technical publications/presentations.

5. Venue: Hong Kong Convention and Exhibition Center, Hong Kong

6. Time: 9:30am-12:30pm, December 16th, 2008.

7. Registration fee: HK\$1000

Short Course Introduction at APMC2008

By Prof. Tapan K. Sarkar

1. The course title:

On responses of ultrawideband antennas

2. The course abstract:

Broadband antennas are very useful in many applications as they operate over a wide range of frequencies. The objective of this short course is to study the transient responses of various well-known antennas over broad frequency ranges. As such, the phase responses of these antennas as a function of frequency are of great interest. In the ensuing analysis, each antenna is excited by a monocycle pulse. Many antennas show resonant properties, and numerous reflections exist in the antenna outputs. The first part of this course deals with ways of converting various resonating antennas to traveling-wave antennas by using resistive loading. Appropriate loading increases the bandwidth of operation of the antennas. But the drawback is the additional loss in the load applied to the antenna structure, leading to loss of efficiency to around fifty percent. However, some of the antennas are inherently broadband, up to a 100:1 bandwidth. Hence, the transient responses of these antennas can be used to determine their suitability for wideband applications with low cutoff frequency. The second part of the course will illustrate the radiation and reception properties of various conventional ultrawideband (UWB) antennas in the time domain. An antenna transient response can be used to determine the suitability of the antenna in wideband applications. Finally, experimental results are provided to verify the various time domain properties of some selected antennas.

3. The course prerequisite:

Basic understanding of Maxwell's equations

4. The biography of the speaker:

Tapan K. Sarkar (<http://web.syr.edu/~tksarkar>) received the B.Tech. degree from the Indian Institute of Technology, Kharagpur, in 1969, the M.Sc.E. degree from the University of New Brunswick, Fredericton, NB, Canada, in 1971, and the M.S. and Ph.D. degrees from Syracuse University, Syracuse, NY, in 1975.

From 1975 to 1976, he was with the TACO Division of the General Instruments Corporation. He was with the Rochester Institute of Technology, Rochester, NY, from 1976 to 1985. He was a

Research Fellow at the Gordon McKay Laboratory, Harvard University, Cambridge, MA, from 1977 to 1978. He is now a Professor in the Department of Electrical and Computer Engineering, Syracuse University. His current research interests deal with numerical solutions of operator equations arising in electromagnetics and signal processing with application to system design. He obtained one of the “best solution” awards in May 1977 at the Rome Air Development Center (RADC) Spectral Estimation Workshop. He received the Best Paper Award of the IEEE Transactions on Electromagnetic Compatibility in 1979 and in the 1997 National Radar Conference. He has authored or coauthored more than 300 journal articles and numerous conference papers and 32 chapters in books and fifteen books, including his most recent ones, *Iterative and Self Adaptive Finite-Elements in Electromagnetic Modeling* (Boston, MA: Artech House, 1998), *Wavelet Applications in Electromagnetics and Signal Processing* (Boston, MA: Artech House, 2002), *Smart Antennas* (John Wiley & Sons, 2003), *History of Wireless* (John Wiley & Sons, 2005), and *Physics of Multiantenna Systems and Broadband Adaptive Processing* (John Wiley & Sons, 2008).

Dr. Sarkar is a Registered Professional Engineer in the State of New York. He received the College of Engineering Research Award in 1996 and the Chancellor’s Citation for Excellence in Research in 1998 at Syracuse University. He was an Associate Editor for feature articles of the IEEE Antennas and Propagation Society Newsletter (1986-1988), Associate Editor for the IEEE Transactions on Electromagnetic Compatibility (1986-1989), Chairman of the Inter-commission Working Group of International URSI on Time Domain Metrology (1990–1996), distinguished lecturer for the Antennas and Propagation Society from (2000-2003), Member of Antennas and Propagation Society ADCOM (2004-2007) and on the board of directors of ACES (2000-2006), vice president of the Applied Computational Electromagnetics Society (ACES) and a member of the IEEE Electromagnetics Award board (2004-2007). He is currently an associate editor for the IEEE Transactions on Antennas and Propagation. He is on the editorial board of Digital Signal Processing – A Review Journal, Journal of Electromagnetic Waves and Applications and Microwave and Optical Technology Letters. He is a member of Sigma Xi and International Union of Radio Science Commissions A and B.

He received Docteur Honoris Causa both from Universite Blaise Pascal, Clermont Ferrand, France in 1998 and from Politechnic University of Madrid, Madrid, Spain in 2004. He received the medal of the *friend of the city of Clermont Ferrand*, France, in 2000.

5. Venue: Hong Kong Convention and Exhibition Center, Hong Kong
6. Time: 9:30am-12:30pm, December 16th, 2008.
7. Registration fee: HK\$1000

Short Course Introduction at APMC2008

By Prof. Stepan Lucyszyn

1. The course title:

[Introduction to RF MEMS](#)

2. The course abstract:

Radio frequency microelectromechanical 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 growth in its development. 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.

Surprisingly, the first RF MEMS device was reported more than 25 years ago by IBM. Even more surprisingly, to date, there are very few commercial devices available on the open market. So why does this technology appear to be stalling? This lecture aims discuss some of the main issues that are impeding the progress of RF MEMS, from the technology-to-applications-to-market.

The course it aimed at those who are new to the area of RF MEMS and involved in general fabrication processing or microwave circuits & systems design.

3. The course prerequisite:

Foundations of microwave circuits

4. The biography of the speaker:

Stepan Lucyszyn *FIEE, FInstP, FEMA, SMIEEE* is currently a *Reader (Associate Professor)* in Millimetre-Wave Electronics at Imperial College London and a *Visiting Professor* at Tsinghua University (Beijing, China). Following 12 years of RFIC/MMIC research, he has spent the past 7 years focusing on RF MEMS. During the summer of 2002, Dr Lucyszyn worked as a *Guest Researcher*, within the MEMS laboratory of the *National Institute of Advanced Industrial Science and Technology* (Tsukuba, Japan). In 2004, he published a review paper on RF MEMS technology, which won an IEE Premium Award in 2005. From 2004-2007, he represented Imperial within the European Union's *Framework VI* Network of Excellence on *Advanced MEMS for RF and Millimeter Wave Communications (AMICOM)*. To date, Dr Lucyszyn has (co-)authored well over 100 technical papers in applied physics and engineering, and presented many invited lectures at

international conferences and workshops. In Nov. 2005, he was appointed an *Associate Editor* for the *IEEE/ASME Journal of Microelectromechanical Systems*. In 2005, he was elected *Fellow* of the Institution of Electrical Engineers (UK) and *Fellow* of the Institute of Physics (UK), and in 2008 made a *Fellow* of the Electromagnetics Academy (USA).

5. Venue: Hong Kong Convention and Exhibition Center, Hong Kong
6. Time: 9:30am-12:30pm, December 16th, 2008.
7. Registration fee: HK\$1000

Short Course Introduction at APMC2008

By Prof. Takashi Ohira

1. The course title:

[Pseudolinear Approach to Sinusoidal Oscillator Performance Maximization](#)

2. The course abstract:

Any radio-frequency signal used in wireless communication, sensor, or radar system originates from a sinusoidal oscillator. Performance of the oscillator is one of the inherent factors determining the quality of RF signal. This short course introduces an approach to fast optimization of the circuit topology and parameters in sinusoidal oscillators. The theory starts from a system model composed of standard active and passive elements. We then include even the output load in the circuit, so that there is no longer any interaction with the outside of the system through the port. This model is thus called no-input-no-output (NINO) oscillator. The circuit is cut at an arbitrary branch, and is characterized in terms of the scalar impedance from the cut point. This is called active impedance because it is a function of not only the stimulating frequency but also the active device gain. The oscillation frequency and necessary device gain are estimated by solving impedance-domain Barkhausen equilibrium equations. This estimation works for the adjustment of circuit elements to meet the specified oscillation frequency. The estimation of necessary device gain enables us to maximize the oscillation amplitude, thanks to the inherent negative-slope nonlinearity of active devices. The active impedance is also used to derive the oscillation quality factor (Q factor), which serves as a key criterion for sideband noise minimization i.e. frequency spectrum purification. As an alternative measure to active impedance, we also introduce branch admittance matrix determinant. This has the same numerical effect as the scalar impedance but can be used to formulate oscillator characteristics in a more elegant fashion, and provides a lucid picture of the physical behavior of each element in the circuit. The course concludes with useful tabulated formulas of oscillation frequency, necessary device gain, active Q factor for a variety of typical Colpitts, Hartley, and cross-coupled twin-FET (field-effect transistor) oscillators.

3. The course prerequisite :

Any student or engineer interested in oscillator theory or design can enjoy this program.

4. The biography of the speaker:

Takashi Ohira received the B.E. and D.E. degrees in communication engineering from Osaka University, Osaka, Japan, in 1978 and 1983. In 1983, he joined NTT Electrical Communication

Laboratories, Yokosuka, Japan, where he was engaged in research on monolithic integration of microwave semiconductor devices and circuits. He developed GaAs MMIC transponder modules and microwave beamforming networks aboard Japanese domestic multibeam communication satellites, Engineering Test Satellite VI (ETS-VI) and ETS-VIII, at NTT Wireless Systems Laboratories, Yokosuka, Japan. Since 1999, he has been engaged in research on wireless ad-hoc networks and microwave analog adaptive antennas aboard consumer electronic devices at ATR Adaptive Communications Research Laboratories, Kyoto, Japan. Concurrently he was a Consulting Engineer for National Space Development Agency (NASDA) ETS-VIII Project in 1999, and an Invited Lecturer for Osaka University from 2000 to 2001. From 2005, he was Director of ATR Wave Engineering Laboratories, Kyoto, Japan. Currently, he is Professor of Toyohashi University of Technology. He coauthored *Monolithic Microwave Integrated Circuits* (Tokyo: IEICE, 1997). Prof. Ohira was awarded the 1986 IEICE Shinohara Prize, the 1998 APMC Prize, and the 2004 IEICE Electronics Society Prize. He serves as EuMA Award Committee Member, APMC International Steering Committee Member, IEICE Microwave Committee Vice Chair, IEEJ Millimeter-Wave Committee Chair, and URSI Commission C Chair. He is an IEEE Fellow and the Founding Chair of IEEE MTT-S Kansai Chapter.

5. Venue: Hong Kong Convention and Exhibition Center, Hong Kong
6. Time: 9:30am-11:00pm, December 16th, 2008.
7. Registration fee: HK\$1000

Short Course Introduction at APMC2008
By Prof. Mark Montrose

1. Course title:

Fundamental Concepts of Signal Integrity and EMC Related to Printed Circuit Boards

2. Course abstract:

This course presents both simplified theory and rules-driven, hands-on knowledge for enhancement of signal integrity for high-speed signals along with suppression of RF energy (EMI) developed within a printed circuit board. The focus is at the *fundamental* level. Rigorous mathematical analysis and theory will not be presented however, results from simulations will be examined to show the need for understanding why it is important to implement proper design techniques early during the development cycle.

Every year we see faster and more complex components being used in everyday products. Advances in semiconductor manufacturing are now making design rules and layout techniques for printed circuit boards more difficult for those not using simulation software. Currently, signal integrity is surpassing EMI concerns. Engineers need to recognize the need for keeping current with newer technologies. The course also provides insight on how to implement layout techniques that are significantly more complex than designs of yesterday with a focus toward multi-layer, high-density printed circuit boards. Requirements for single- and double-sided designs are examined based upon fundamental concepts related to the design of multi-layer assemblies.

The target audience is those that are still new to the field of EMC and desire greater knowledge on advanced concepts in a short period of time. Experienced engineers will also benefit significantly as the material will highlight fundamental aspects of engineering principals that one generally forgets when dealing with complex problems, as well as presenting insight into aspects of printed circuit board design and manufacturing generally unknown to designers.

3. Course prerequisite:

This course requires one to only have a desire to learn about how to design a printed circuit board to meet signal integrity and EMC requirements. Past experience in trying to solve board level failures is a plus in addition to having prior knowledge on how printed circuit boards are created by design engineers. The more background in working with printed circuit will also be of significant benefit.

4. The biography of the speaker:

Mark Montrose is principal consultant of Montrose Compliance Services, Inc., a full service regulatory compliance firm specializing in electromagnetic compatibility (EMC) with twenty eight years experience as a trainer, consultant, systems designer, product engineer, manufacturing engineer and component engineer. He specializes in the design, test and certification of Information Technology and Industrial, Scientific and Medical Equipment and Communication Systems.

His professional active are within the Institute of Electrical and Electronics Engineers (IEEE) and includes being a Senior member, Member of the Board of Directors of the IEEE (2009-2010), current member of the Board of Directors of the IEEE Electromagnetic Compatibility Society (EMCS), Past President and Founder of the Product Safety Engineering Society (PSES), and numerous other IEEE positions and activities including past distinguished lecturer for the IEEE EMC Society.

Mark has authored four popular textbooks with international translations on EMC and presented numerous papers on printed circuit board and system design, theory and layout related to EMC and signal integrity at IEEE Colloquiums worldwide. He also provides printed circuit board and system level design and layout seminars to corporate clients internationally in addition to private, hands-on training and consulting.

5. Venue: Venetian Resort and Convention Center, Macau

6. Time: 9:30am-12:30pm, December 20th, 2008.

7. Registration fee: HK\$1000

Short Course Introduction at APMC2008

By Prof. Ping Li

1. The course title:

[Interleave-Division Multiple-Access System](#)

2. The course abstract

A. Motivation

Interleave-division multiple-access (IDMA) is a recently proposed multiple-access scheme for wireless communications. In this tutorial, we will across-the-board introduce the basic principles of IDMA system.

B. Content

As a potential solution to multimedia services in multiple access systems, interleave-division multiple-access (IDMA) has been investigated recently. With IDMA, users are solely distinguished by user-specific interleavers and receiver is based on a very low-cost iterative chip-by-chip (CBC) multi-user detection principle. IDMA possesses many desired features for future wireless systems that are difficult to achieve simultaneously with the current technologies such as FDMA, TDMA, CDMA and OFDMA. These include

- low receiver cost (near single-user complexity),
- near optimal multi-user performance,
- de-centralized (i.e., asynchronous) control,
- simple treatment of ISI using the OFDM-IDMA principle,
- cross-cell interference mitigation,
- wide-band diversity against fading,
- high capacity (e.g., supporting 64 users with a spreading ratio of only 8),
- high throughput (e.g., rate > 8 bits/Hz),
- multi-user gain that turns the near-far effect into an advantage,
- straightforward extension to MIMO systems.

IDMA has been considered with the Third Generation Partner Project (3GPP) as a physical layer option for European Evolved UTRA multiple access. In this tutorial, we will provide a comprehensive coverage of the IDMA principles. We will also provide both analytical and simulation results to demonstrate the features listed above.

C. Outline

- Introduction to IDMA
- Chip-by-chip iterative detection principle
- Analysis and performance bounds of IDMA systems
- Power allocation and system optimization
- OFDM-IDMA systems
- Superposition coding and its application in adaptive modulation
- IDMA principle for MIMO systems
- Multi-user gain and power efficiency of IDMA in fading environments
- Applications

3. The course prerequisite :

Basic knowledge of wireless communication, iterative detection and iterative decoding.

4. The biography of the speaker

Dr. Ping Li received his Ph.D. degree at Glasgow University in 1990. He lectured at Department of Electronic Engineering, Melbourne University, from 1990 to 1992, and worked as a research staff at Telecom Australia Research Laboratories from 1993 to 1995. He has been with the Department of Electronic Engineering, City University of Hong Kong, since January 1996 where he is now a professor. He was awarded a British Telecom - Royal Society Fellowship in 1986, IEE J J Thomson premium in 1993 and Croucher Award in 2005.

5. Venue: Venetian Resort and Convention Center, Macau

6. Time: 9:30am-12:30pm, December 20th, 2008.

7. Registration fee: HK\$1000