IMOC2017
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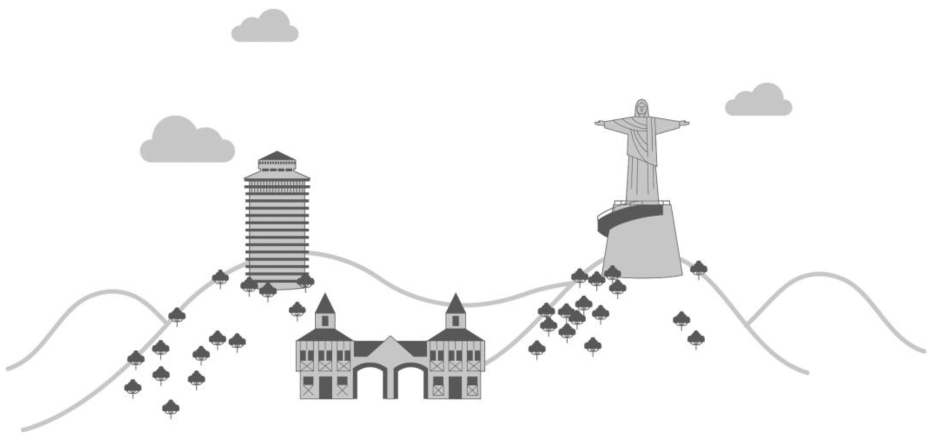
SBMO/IEEE MTT-S

International Microwave and Optoelectronics Conference

Majestic Hotel, Águas de Lindoia, Brazil

August 27th—30th

Bridging Academia, Research Centers, and Industry



SHORT COURSES

Sunday, August 27th			
Secretary Room			
08:00 to 17:00	Registration		
Esmeralda Room			
10:40 to 11:00	Coffee Break		
15:40 to 16:00	Coffee Break		
Safira Room			
09:00 to 17:40	**SC-M-SUN**	**Short Course**	**Instructor**
09:00 to 10:40 11:00 to 12:40	SC-M-SUN-01	RF Circuit Design Using Electromagnetic Simulation Tool	Mauricio Kobayashi / Keysight Technologies Medição Brasil Ltda - BR
14:00 to 15:40	SC-M-SUN-02	Radar Antennas - An Insigth of the Radar Function Through Its Antennas	Antonio Dias de Macedo Filho / Alfadelta-Rio - BR
16:00 to 17:40	SC-M-SUN-03	Radar Reflectivity and Stealth Platforms - Understanding the Secrets of Stealth Aircrafts, Ships and Missiles	
Ametista Room			
09:00 to 17:40	**SC-O-SUN**	**Short Course**	**Instructor**
09:00 to 10:40	SC-O-SUN-01	Coherent Optical Technologies for High Capacity Systems - Theory	Andrea Chiuchiarelli - Eduardo Rosa / CPqD BR
11:00 to 12:40		Coherent Optical Technologies for High Capacity Systems - Experimental	Rodrigo Vicentini / Keysight - BR
14:00 to 15:40	SC-O-SUN-02	Power-over-Fiber Applications in the Industry of Utilities and Telecommunications	João Batista Rosolem / CPqD - BR
16:00 to 17:40	SC-M-SUN-04	Basic and Advanced Topics in Signal Integrity - Technical Challenges and Industry Trends	Davi Correia / Carlisle Interconnect Technologies - USA

Sunday, August 27th - Safira Room, 09:00-12:40

SC-M-01

RF Circuit Design Using Electromagnetic Simulation Tool Keysight ADS

Instructor: Mauricio Kobayashi

Mauricio Kobayashi was born in São Paulo in 1974. He was educated at Instituto Tecnológico de Aeronáutica - ITA, where he graduated with a degree of Electronic Engineering in 1997. His professional career started at Hewlett Packard, in 1998, as Application Engineer for Spectrum Analyzers, Signal Generators and Network Analyzers. Since 2001, he has worked as Agilent Key Account Manager covering Aerospace & Defense, Wireless, Education, Semiconductor accounts. Since 2012, he also has acted as Business Development Engineer for Agilent/Keysight EDA Tools.

Institution: Keysight Technologies Medição Brasil Ltda

Contact information: mauricio_kobayashi@keysight.com

Description:

Great for beginners, this hands-on mini-course demonstrates how to get started using Advanced Design System (ADS) without assuming any prior ADS experience. You can also learn how to tune and optimize your design. Become familiar with ADS libraries and quickly add components to your design. After completing this course, you will be able to design your own LPFs and BPFs in Schematics+Layout environments and build your own Plan Electromagnetic Simulation (EM). Every attendee will receive link to download demonstration guides for design of couplers, power dividers, amplifiers, mixers, microwave oscillators and MEMS switches.

Requirements

For the practical part, temporary licenses will be provided to all participants. To generate those temporary licenses, the instructor will need the Mac Address of the participants' laptop, assuming they will take their laptops to the course.

Agenda:

- Effective Operation of ADS User's Interface;
- Circuit Design Using Schematic and Layout environments;
- S-Parameters Concepts Review;
- EM Simulation Technologies MoM, FEM and FDTD;
- Filter Design using simulators “S-Parameter” and “Momentum”.

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4. The Analysis and Design of Linear Circuits, Wiley, ISBN: 978-0-470-38330-8
5. Ron Potter´s Book, The Art of Measurement: Theory and Practice, ISBN 0-13-026174-2

Sunday, August 27th - Safira Room, 14:00-15:40

SC-M-02

Radar Antennas - An Insight of the Radar Function Through Its Antennas

Instructor: Antonio Dias de Macedo Filho

He holds a degree (1980) and a master's degree (1984) from the Pontifical Catholic University of Rio de Janeiro, a doctorate in Antennas and Radar from University College of London (1996) and a doctorate in Naval Policy and Strategy by Escola de Guerra Naval (2006). He was an assistant professor at Santa Úrsula University, until December 2005, and at Gama Filho University, until December 2011. He has experience in Electrical Engineering, with emphasis on Electromagnetic Theory, Microwave, Wave Propagation, Antennas, Neural Networks and Fuzzy Logic. Topics: electronic warfare, defense systems, SRR measurement, monitoring systems, delays, tracking error, monopulse and dft. He was also a professor at UERJ (2008-2009) and Naval School (2010). He owns a company, Alfadelta-Rio, and has worked for SUTECH Engenharia for almost 4 years. In October 2012, he took a leave of absence from Alfadelta and worked on the PROMETRO EMC/EMI Project at INMETRO. In August 2015 he resumed his activities as the Alfadelta-Rio CEO.
Institution: Alfadelta-Rio
Contact information: admacedof@iee.org

Description:

Radars are used in a large variety of applications and their main architecture main change somewhat from case to case. However, for intelligence gathering purpose, the main feature that a technical observer can distinguish is its antennas. Moreover, the technical status of the radar may also be inferred and any technological breakthrough may be investigated. This course will deal with two main subjects: The first one is to describe the several kinds of radar and their main applications. The second one is how these radars must spread into space the energy provided by their transmitters. The analysis of such feature is crucial to pinpoint the possible use of the radar.
Keywords: radar; antennas; reflector; surveillance; tracking; signal processing.

Agenda:

Types of Radars

- Non Imaging Radars;
- Pulse and Intrapulse Modulation;
- Navigation Aid Radars; and
- Weather Radar.

Radar Antennas

- Monopole and Dipole Radar Antennas;
- Full Parabolic Reflector Radar Antennas;
- Cut and Shaped Parabolic Reflectors Radar Antennas;
- Phased Array Radar Antennas; and
- Long Antennas for HF Radars.

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Sunday, August 27th - Safira Room, 16:00-17:40

SC-M-03

Radar Reflectivity and Stealth Platforms - Understanding the Secrets of Stealth Aircrafts, Ships and Missiles

Instructor: Antonio Dias de Macedo Filho

He holds a degree (1980) and a master's degree (1984) from the Pontifical Catholic University of Rio de Janeiro, a doctorate in Antennas and Radar from University College of London (1996) and a doctorate in Naval Policy and Strategy by Escola de Guerra Naval (2006). He was an assistant professor at Santa Úrsula University, until December 2005, and at Gama Filho University, until December 2011. He has experience in Electrical Engineering, with emphasis on Electromagnetic Theory, Microwave, Wave Propagation, Antennas, Neural Networks and Fuzzy Logic. Topics: electronic warfare, defense systems, SRR measurement, monitoring systems, delays, tracking error, monopulse and dft. He was also a professor at UERJ (2008-2009) and Naval School (2010). He owns a company, Alfadelta-Rio, and has worked for SUTECH Engenharia for almost 4 years. In October 2012, he took a leave of absence from Alfadelta and worked on the PROMETRO EMC/EMI Project at INMETRO. In August 2015 he resumed his activities as the Alfadelta-Rio CEO.

Institution: Alfadelta-Rio
Contact information: admacedof@iee.org

Description:

Modern radars face the challenge of low Radar Cross Section (RCS) targets. These targets are designed with the intention to reflect the least possible energy back in the direction of the incident radar signals. These studies are conducted since the radar early days at II World War and today there are plenty of examples of aircrafts and ships of very low RCS.

This Short Course intents to present radar signal propagation and to describe the Radar Cross Section of specific targets. It will show how the use of special materials and proper shaping of the target superstructure can reduce this parameter. It will also be discussed how radars can overcome such measures and be able to detect the so-called stealth platforms.

The course will first describe the basics of radar signal propagation and how the RCS will limit the target detection. After the main techniques used to reduce the platform's RCS will be described. In sequence, several examples of stealth aircrafts, ships, missiles and land vehicles will be shown and commented. Finally, some techniques used by radar designers to provide them with low RCS detection capability are discussed.

This course will also be useful to introduce graduate engineers and students to the radar science which is a field closely related to telecommunications engineering

Keywords: radar; signal propagation; radar cross section; radar absorving materials; shapped super structures; signal processing

Agenda:

- The Radar Equation

This part will deduce and describe the radar equation. It will show the importance of the Radar Cross Section, the only parameter that is only function of the target itself.

1. Deducing the Radar equation;
2. Radar Equation Parameter Analysis; and
3. Radar Cross Section.

- RCS Reduction Techniques

The main RCS reduction techniques will be explained such as the use of Radar Absorbing

Materials (RAM) and the judicious shaping of the platform's super structure. Other less known techniques such as water jets are also commented.

1. Radar Absorbing Materials (RAM);
2. Target Super Structure Shaping; and
3. Non-Traditional Techniques.

- Low RCS Platform Anlysis

A number of pictures of stealth targets are shown, including aircrafts, ships, missiles, drones and land vehicles. The previously presented techniques are pointed out in every one of them as a practical exercise.

1. Historical Designs from IIWW;
2. Tacit and Have Blue;
3. SR-71 Blackbird;
4. F 117;
5. B-2 bomber;
6. Stealth UAV and drones;
7. Stealth Missiles;
8. Future Stealth Airplanes;
9. First Stealth Ships;
10. La Fayette Class Frigates;
11. Arsenal Ships;
12. Some USN Designs for Stealth Ships;
13. Sea Shadow;
14. Future Stealth Ships; and
15. Stealth Land Vehicles.

- Anti Stealth Radar Systems

Contrasting to the RCS reduction techniques, the radars make use of other techniques to enhance their capability to detect low RCS targets. Some examples such as the Russian NEBO M, shown in Fig. 3 [3] and the Multi-Static Radars are explained.

1. Proper Frequency Tuning;
2. Multi-Static Radars;
3. Proper Polarization Tunning; and
4. Other Non-Traditional Detection Enhancement Techniques

Bibliography

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Sunday, August 27th - Ametista Room, 09:00-12:40

SC-O-01

Coherent Optical Technologies for High Capacity Systems.

Instructor 1: Andrea Chiuchiarelli

Andrea Chiuchiarelli received his BSc degree in Electronic Engineering from the University of L'Aquila, Italy, in 2005, and his PhD in Innovative Technologies from Scuola Superiore S.Anna, Italy, in 2010. From January 2013 to November 2014 he was a visiting post-doc researcher at Unicamp, Campinas, Brazil. Since November 2014 he is a senior researcher at CPqD, in the Division of Optical Technologies. His main areas of interest are optical communication systems, coherent optical technologies and high capacity optical data center interconnect.
Institution: CPqD – Research and Development Center in Telecommunications

Instructor 2: Eduardo Rosa

Eduardo de Souza Rosa holds a degree in Electrical Engineering from the State University of Campinas (2008), a Master's degree in Electrical Engineering from the State University of Campinas (2010) and PhD in Electrical Engineering, to be concluded at Unicamp. He is currently the Head and Leader of the Optical Communication group at CPqD, the Telecommunications Research and Development Center Foundation. He has experience in Electrical Engineering, with emphasis on Optical Communications Systems and Signal Processing for Communications.
Institution: CPqD – Research and Development Center in Telecommunications

Instructor 3: Rodrigo Vicentini

Rodrigo holds a degree in Electrical Engineering - Telecommunication, from the Polytechnic School of University of São Paulo (2002), a Project Management Lato Sensu Specialization, from University of São Paulo (2007), and a Master of Business Administration (MBA) on Emerging countries, innovation and high technology (2013). He has worked as a Business development engineer for digital test division in Brazil and Southern Cone at Agilent Technologies (2005-2014), as Application and Business Development at Keysight Technologies (2014-2015) and as Application and Business Manager, at Keysight Technologies, from 2015 to present date.
Institution: Keysight Technologies BR

Contact information: andreach@cpqd.com.br

Description:
In an era where the demand for IP traffic from users and enterprises is constantly increasing, coherent optical communications are widely established as the most effective solution to ensure high capacity per bandwidth over distances that range from a few kilometers to thousands of kilometers.
Today, coherent optical technologies represent the core of metro and long-haul transmission systems, enabling transmission of a tremendous amount of data with the highest spectral efficiency. More recently, coherent optics also gained wide interest for shorter reach applications, such as data center interconnect, due to its technological maturity and increasing cost effectiveness compared to direct detection systems.
This short course will give an overview on digital coherent optical technologies, both from a system and signal processing point of view. In the first part of the course, the building blocks of a coherent optical system will be reviewed, along with the main transmission scenarios. The second part will focus on digital signal processing techniques for signal generation and detection, highlighting its benefits and pointing out the main challenges to be overcome for each of the proposed transmission scenarios.

Agenda:

- Introduction
- Overview on Coherent Optics
- Coherent Optical Systems: architecture and building blocks
- Coherent optical signal generator
- Optical coherent detection
- Application scenarios
- Research on coherent optical systems at CPqD
- Digital Signal Processing for coherent optical systems
- Coherent DSP building blocks
- Benefits and challenges of coherent DSP
- Research and development in coherent DSP at CPqD
- Experimental hands on

Bibliography

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Sunday, August 27th - Ametista Room, 14:00-15:40

SC-O-02

Power-over-Fiber Applications in the Industry of Utilities and Telecommunications.

Instructor: João Batista Rosolem

Joao Batista Rosolem received the Ph.D. degree in Electrical Engineering from University of Sao Paulo, Sao Carlos, Brazil, in 2005. Since 1990, he is a researcher of CPqD - Telecommunication Research and Development Center, Campinas, Brazil. He has been involved in the managing of many projects of research, design and characterization of optical sensing system and optical sensors applied to electrical power systems. He has also been engaged in the development of telecommunication trunk and access wavelength division multiplexing (WDM) transmission systems. Dr. Rosolem is a member of OSA and SPIE societies and is author of over 150 journal and conference papers. He is the holder of 3 U.S. patents and more than 20 additional patents are pending in Brazil.

Institution: CPqD – Research and Development Center in Telecommunications

Contact information: rosolem@cpqd.com.br

Description:

Beyond telecommunications optical fibers can also transport optical energy to powering electric or electronic devices remotely. This technique is called power over fiber (PoF). Besides the advantages of optical fiber (immunity to electromagnetic interferences and electrical isolation) the employment of a PoF scheme can eliminate the energy supply by metallic cable and batteries located at remote sites, improving the reliability and the security of the system.

PoF is very interesting technique to be applied in Smart Grid. Smart Grid is seen by experts as the output to a new technological level seeks to incorporate extensively technologies for sensing, monitoring, information technology and telecommunications for the best performance electrical network. On the other hand in passive optical networks (PON) PoF can make PON extenders virtually passives.

This short course describes the PoF principle, its main elements, technologies and the applications focusing in access networks and in smart grid developed by the author.

Objectives: We will present in this course not only a comprehensive review of PoF since the 70's when it was published the first paper for telecommunication application, but a complete explanation about how it works and how it has been applied in real field applications.

Agenda:

- Introduction
- Power over Fiber
- Historical Overview
- Telecom Applications
- Utilities and Other Industries Applications
- Technical principles of PoF
- Main elements of PoF
- High Power Optical Source
- Optical Fiber
- Photovoltaic Converter
- Basic Remote Unit Circuits
- PoF Topologies
- Example of PoF link calculations
- PoF applications developed at CPqD
- PoF applications in telecommunications
- PoF applications in Utilities

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NOTE: For additional resource for this short course, make a free download at https://www.intechopen.com/download/pdf/54645

Sunday, August 27th - Ametista Room, 16:00-17:40

SC-O-03

Basic and Advanced Topics in Signal Integrity - Technical Challenges and Industry Trends

Instructor: Davi Correia

PhD, Signal Integrity Engineer. Dr. Correia obtained his BSc in Electrical Engineering from Universidade de Brasilia (UnB), his MSc in Electrical and Computer Engineering from Universidade de Campinas (UNICAMP) and his PhD in Electrical and Computer Engineering from the University of Illinois at Urbana-Champaign. After spending four years in academia as a visiting scholar and assistant professor in different institutions in Brazil and Europe, he moved to the industry where, since 2010, he has been a signal integrity engineer. He has published papers both in academic journals and industry conferences, given talks, created software and designed products. Since June 2016, he is with Carlisle Interconnect, where he leads the signal integrity group with the design of cables, PCBs, connectors and systems.

Institution: Carlisle Interconnect Technologies
Contact information: davi.correia@carlisleit. com

Description:

This short course will give the student the overall understanding of what signal integrity is, the main technical challenges, and the common solutions. It will address how the microwave/electromagnetic community can contribute in the signal integrity development. The industry trends, state-of-the art solutions and advanced techniques will also be discussed. At the end, the student should be able to identify critical technical challenges in the design phase of high-speed circuits. He should also be able to recognize the industry leaders, what the trends are, and some of the new products and technologies that are coming to the market.

Audience: Electrical engineers, telecommunication professionals, business managers/directors. A basic understanding of transmission line theory is needed.

Agenda:

- From digital to analog, basics of signal integrity: insertion loss, return loss, crosstalk, time-domain reflectometry (TDR). PCB, connector and cable design. Channel margins, eye-patterns.
- Electromagnetic in signal integrity; full-wave solvers; connectors, cables and boards characterization.
- Inside the Chip: equalization techniques, FIR filters, DFE, CTLE, PAM4, NRZ.
- Channel Operating Margin (COM).
- Who does what in the industry. Chips, cables, connectors, PCBs, CAD tools. Where you can play.
- Hands-on simulation: from a basic PCB to a full channel, including chips, cables, connectors and boards.

Bibliography

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