

Bulletin

IEEE Pittsburgh Section

February 2006 Volume 55, No. 2



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Editor of this issue: Jace Cochrane, P.E. jacejc@pghmail.com (412) 390-0718

Contributors: George Crawford, Tom Dionise, Joe Kalasky, Prashant Krishnamurthy, Dimitris Korakakis, George Kumnik, Zhi-Hong Mao, Mike Oliver, John Twigg, Chuck Urso and Dave Vaglia.

All announcements for publication in a particular monthly bulletin are due to the Editor by the 20th of the previous month. Monthly issues of the bulletin are posted on the web site www.ewh.ieee.org/r2/pittsburgh. The accuracy of the published material is not guaranteed. If there is any error, please bring it to the Editor's attention.

• *From the Chair*

It is an honor for me to serve the IEEE Pittsburgh Section as Chair for 2006. Serving on the Executive Committee (ExCom) as Treasurer and Awards Chairman under Kal Sen and Elena Schreiber, and on the Power Engineering Society (PES) and Industry Applications Society (IAS) Administrative Committee in the past has given me the necessary training for the current job.

I thank our outgoing Chair Kal Sen for the tremendous effort and time that he put in serving our Pittsburgh Section. Kal continues to serve our section, currently preparing our application for the Best Section Award in Region 2, which includes Columbus, Cleveland, Baltimore, Philadelphia, Washington DC, and other cities.

I also thank Ralph Sprang, our other candidate for 2006 Chair, for remaining active in the ExCom and serving as Student Activities Chair. Ralph is well suited for this position as he has been working toward his PhD.

This year I would like to increase membership participation in our Section activities and to bring in new members. Please review this bulletin for activities that interest you. One big event for the month of February is the celebration of Engineers Week at the Carnegie Science Center (details in this bulletin). Attend a meeting, and bring a colleague or two. If you have ideas or topics that you want to hear or learn more about, please share them with us.

Lastly, in order to increase our Section activities, we need to attract and retain volunteers. The ExCom meets every third Thursday of the month to plan the Section activities. Please come to a Section meeting to meet your fellow members. There is always a need for support of our Section and your contributions are welcomed. You may call me at (412) 491-6944 or email at davevaglia@ieee.org.

Dave Vaglia

IEEE NANO 2006 Conference in Cincinnati

Consider submitting a paper to this nearby conference. The abstracts are due February 28, 2006. Detailed information about the conference and paper submissions can be found at <http://www.ececs.uc.edu/~mcahay/Nano2006/index2006.html>.

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Computer Society – Chair: John Twigg (see above)

Engineering In Medicine & Biology Society
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Co-Chair: Bob Brooks
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ElectroMagnetic Compatibility Society
Chair: Michael J. Oliver
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Power Engineering & Industrial Applications Societies
Chair: Charles Urso, P.E. (see above)
Vice Chair: Andrew Novotny (see above)

Magnetics Society – Chair: Dr. Ganping Ju
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Publicity – Chair: Thomas Dionise, P.E.
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• *Frequently Asked Questions about EMC*

Speaker: Elya B. Joffe, VP of Engineering, K.T.M. Project Engineering
Date: Tuesday, January 31, 2006
Time: Social begins at 6:30 PM Program 7:00 PM – 8:30 PM
Place: Westinghouse Energy Center Directions on page 6
Contact: Mike Oliver at emi@majr.com or (814) 763-3211

This will be the first meeting of the newly-formed Pittsburgh Chapter of the ElectroMagnetic Compatibility Society (EMCS).

Abstract: It is commonly said that there are many answers to each question, most of which are... wrong! EMC considerations are no different. Moreover, many concepts, but mainly misconceptions, accompany the common EMC "knowledge". Questions regarding such issues as decoupling strategies, PCB layout, enclosure shielding, and ground loop concerns are often addressed, with many (not necessary consistent) answers to each. This presentation includes 12 frequently asked questions and proposed, well-founded replies to each, along with the technical rationale and scientific reasoning. The speaker hopes this lecture will demystify EMC and reveal some of the concepts that to so many are considered "black magic". See page 4 for information about the speaker.

• *Path of Least Inductance Principle*

Speaker: Elya B. Joffe, VP of Engineering, K.T.M Project Engineering
Date: Wednesday, February 1, 2006
Time: Program 5:00 PM – 6:15 PM
Place: Westinghouse Energy Center Directions on page 6
Sponsor: EMCS Chapter
Contact: Mike Oliver at emi@majr.com or (814) 763-3211

Abstract: Few principles in EMC are confusing as much as those of "Grounding" and "Shielding". Indeed, misconceptions as to the mechanisms of those techniques have led to many wrong concepts and implementations, which today are extremely difficult to uproot. Is it better to use single point or multi-point grounding? In which frequencies? Is it better to ground a shield at both ends or at one only? And how about the signal circuits? How does return current flow on the PCB? Does it follow the shortest path? The key to the answer to all these questions lies within the domain of a concept called: "The Path of Least Inductance". That is the path that current will follow at high frequencies. (What is "high" for this purpose?) This lecture will discuss the very important concept of the "Path of Least Inductance", and the application of this principle for providing answers to the above questions and others. The presentation will be primarily practical, with mathematical derivation kept to the absolute minimum, while applications and practical examples will be elaborated and discussed extensively.

This program will be immediately followed by a social and the program described below. See page 4 for information about the speaker.

• *Electrophobia or Why are People Really Scared of EM Fields?*

Speaker: Elya B. Joffe, VP of Engineering, K.T.M. Project Engineering
Date: Wednesday, February 1, 2006

Time: Social begins at 6:15 PM Program: 7:00 PM – 8:30 PM
Place: Westinghouse Energy Center Directions on page 6
Contact: Mike Oliver at emi@majr.com or (814) 763-3211

Abstract: Why are people really scared of Electromagnetic Fields (EMF)? Are they really the "killing fields" as denoted by the press? Some common claims against EMF include: "Science still does not know how dangerous the radiation is, but, within a year, a decade, a century, it will"; "Standards for limiting dangerous exposure were prepared by biased parties"; "Standards consider thermal effects only, whereas, many a-thermal effects, including cancer, are not considered"; "Wait and see - EMR exposure will be similar to asbestos and smoking" (and yet, they keep on smoking); "Well-known, respectable scientists do not exclude connection between EMR and cancer"; "Prudent Avoidance - better be safe than sorry". This presentation attempts to shed light on the issue of "Electrophobia". It discusses the history of EMF usage, the evolution of EMR standards- from the turn of the 20th century to date, and the evolution of the public response to EMF and its usage. Although the presentation covers only technically acceptable figures, statistics, etc., it rather addresses this controversial issue from a user's point of view, addressing the sources of fear, the facts and fallacies, and the risk in risk research.

About the speaker:



Elya B. Joffe has been employed by K.T.M. Project Engineering, an engineering consulting company in Israel, since 1987. He holds the title VP of Engineering and works as a Senior EMC engineering specialist and consultant. Elya earned a B.ScEE in Electrical Engineering from the Ben Gurion University in Israel, is a Registered Professional Engineer and is a NARTE- (US National Association of Radio and Telecommunications Engineers) certified EMC and ESD Control Engineer. Elya has over 25 years of experience in government and industry in EMC/E³ (Electromagnetic Compatibility/ Electromagnetic Environmental Effects) for electronic systems and platforms (in particular – aircraft and aerospace). He is actively involved in the EMC design of commercial and defense systems from circuits to full platforms. His work covers various fields in the discipline of EMC, such as NEMP and lightning protection design, as well as numerical modeling for solution of EMC Problems. Mr. Joffe is also well-known in Israel and abroad for his activities in EMC training and education, having developed and presented many courses on EMC and related topics. He has authored or co-authored over 30 papers published in the IEEE Transactions on EMC and Broadcasting or the Proceedings of International EMC Symposia.

Mr. Joffe is Senior Member of IEEE and has served as a member of the IEEE EMC Society Board of Directors since the year 2000. Elya is currently the VP for Member Services and the Past VP for Conferences and Symposia. He is also the Immediate Past Chairman of the Israel IEEE EMCS Chapter. He serves as the Israel IEEE Section Industry Relation Officer (IRO). Mr. Joffe is a member of the IEEE Standards Association, a member of the IEEE EMC Society Standards Development Committee (SDCom) and Chairman of the EMC-S Standards Advisory and Coordination Committee (SACCom). He is also Chairman of WG 473 for revision of IEEE STD 473 ("IEEE Recommended Practice for an Electromagnetic Site Survey (10 kHz to 40 GHz)"). Mr. Joffe served as a "Distinguished Lecturer" of the IEEE EMC Society in 1999 and 2000. He has received several awards from the IEEE and EMC Society, including the IEEE EMC Society Laurence G. Cumming Award for Outstanding Service. Recently Elya was elected the recipient of the very prestigious 2006 IEEE RAB Larry K. Wilson Transnational Award.

- ***Parallel-WDM Optical Interconnects for Multi-Terabaud Computer Backplanes***

Speaker: Dr. Brian E. Lemoff, Director of Research and Advanced Concepts, ISR
Date: Monday, February 6, 2006
Time: 4:00 PM
Place: Room G39, Engineering Sciences Building, West Virginia University
Contact: Dr. Dimitris Korakakis at (304) 293-0405 x2512

Abstract: By the beginning of the next decade, high-end computer systems will require board interconnect bandwidths of tens of terabits-per-second. To carry such enormous bandwidths between boards, optical interconnects must be developed that maximize bandwidth per unit area and minimize power consumption and cost. The "MAUI project", recently completed by Agilent Laboratories, developed a new technology called Parallel Wavelength Division Multiplexing (PWDM), in which tiny, chip-scale subassemblies transmit and receive multiple wavelengths through each fiber of a parallel fiber ribbon. This talk will describe the motivation and approach and will present results at 250-Gb/s and 500-Gb/s aggregate data rates for 48-channel subassemblies consuming 1.5W and 3.0 W respectively with a footprint of 5 mm x 8 mm.

About the speaker: Dr. Brian E. Lemoff has been the Director of Research and Advanced Concepts at the Institute for Scientific Research in Fairmont, WV since October 2005. Prior to joining ISR, Lemoff managed a research group for Agilent Laboratories in Palo Alto, CA, developing advanced technologies for ultra-compact, ultra-low-cost multi-wavelength optical interconnects. His pioneering work in coarse WDM for the LAN has been extensively published, and Lemoff played a key role in gaining acceptance for coarse WDM in the IEEE 10-Gigabit Ethernet standard. Lemoff received his Ph.D. in physics from Stanford University in 1994. For his doctoral work in the area of ultra-short pulses and X-ray lasers, Lemoff was awarded the 1995 American Physical Society award for outstanding doctoral research in atomic, molecular, and optical physics. Lemoff received his B.S. and M.S. degrees from Caltech.

- ***MOVPE Grown InAs Quantum Dots for Nanostructured PV***

Speaker: Seth Hubbard
Date/Time: Monday, February 13, 2006 4:00 PM
Place: Room G39, Engineering Sciences Building, West Virginia University
Contact: Dr. Dimitris Korakakis at Dimitris.Korakakis@mail.wvu.edu

About the speaker: Seth received his BS degree in Physics from Drexel University in 1995 and his MS in Electrical Engineering from Case Western Reserve University in 1998. His thesis work involved Electron Beam Induced Current (EBIC) characterization of wide bandgap semiconductors (SiC, GaN, etc.). Seth joined the III-V Integrated Device and Circuit Group at the University of Michigan and received his Ph.D. in Electrical Engineering in 2005. His research at Michigan involved Metal Organic Vapor Phase Epitaxy (MOVPE) growth and characterization of III-Nitride heterostructures for application in electronic devices. The emphasis was on AlN/GaN heterostructures for high-power Metal Insulator Semiconductor Field Effect Transistors (MISFETs). Currently Seth is employed as a National Research Council Associate at NASA Glenn Research Center, Photovoltaic and Space Environment Branch in Cleveland, OH. This branch is working on design, growth, fabrication and characterization of next generation space solar power. Seth is involved with design and growth of nanostructured solar cells to improve overall cell efficiency.

- ***Impact of Power Quality on Facilities Management***

Speakers: Dan Carnovale, Performance Power Solutions Manager, Eaton Electrical
Tom Dionise, Senior Power Systems Engineer, Eaton Electrical

Date: Monday, February 13, 2006

Time: 6:00 PM Dinner \$10
6:30 PM Presentation
7:15 PM Power Quality Solutions Lab Demonstration

Place: Eaton Electrical, 130 Commonwealth Dr, Warrendale PA 15806

Sponsors: Association of Energy Engineers (AEE), Association for Facilities Engineering (AFE), and Pittsburgh Section of IEEE (IAS/PES)

RSVP: **By Monday, February 6** to Tom Visconti at (724) 779-5805 or thomasavisconti@eaton.com. Let him know if you will be attending the dinner (\$10) or only the presentation and demonstration (no charge). Dinner will be Italian breaded chicken with a side dish of Pasta Marinara, salad, bread and butter, and a beverage.

The demand for increased reliability and the heightened sensitivity of electronic loads have forced the modern facilities manager to take a new approach. A successful strategy requires an understanding of power quality issues and knowledge of available solutions. This presentation will begin with an overview of the power quality issues impacting facility operations, especially harmonics, that are often difficult to understand. Following the overview, several full-scale problem solutions will be demonstrated in Eaton's new Power Quality Solutions Lab. These demonstrations will show the detrimental effects of several common power quality problems, as well as the improvements to be expected from different types of mitigating equipment.

Directions to Eaton Electrical: From downtown Pittsburgh take I-279 North for 13 miles and merge into I-79 North. After 4 miles, Exit I-79 North at Exit 75, Warrendale. At the traffic light at the end of the exit ramp, turn left onto Warrendale-Bayne Rd. Turn right at the Park N Ride onto Brush Creek Rd. At the second traffic light at the intersection with Thorn Hill Rd, Brush Creek Rd becomes Commonwealth Dr. Continue on Commonwealth for about 0.1 mile, then turn left into 130 Commonwealth Dr.

Directions to Westinghouse Energy Center

From Pittsburgh take Interstate 376 East (Parkway East). Take Exit 14A to Monroeville. Cross Business Rt 22 at the traffic light and proceed on Rt 48 South (Moss Side Blvd) approx ½ mile (two traffic lights). The 2nd traffic light is at a 4-way intersection with an Exxon station on the right. Turn left onto Northern Pike. Proceed approx 0.2 miles and turn right at the 1st traffic light onto Westinghouse Dr. Travel 0.7 miles (past the guard stand) to the 3 flags where the building's main entrance is located. Parking the evening will be plentiful. Use the main entrance and check with the security guards inside. You will be directed to the proper room for your meeting.

From the PA Turnpike, take Exit 57 (Monroeville). After the toll plaza, get in the left lane to get on Business Rt 22 West. At the first light, turn left onto Rt 48 South (Moss Side Blvd) and follow the above directions.

- ***Engineering in Medicine and Biology Society Meeting***

Date: Wednesday, February 15, 2006
Place: University of Pittsburgh, Oakland Campus
Contact: Dr. Zhi-Hong Mao at maozh@engr.pitt.edu for details

- ***Engineers Week-IEEE Table***

Volunteers are still needed for the IEEE demonstration table for Engineers Week 2006 at the Carnegie Science Center (CSC) on **Saturday, February 18**. CSC expects more than 600 engineers and several thousand children and adults to attend. The IEEE has taken an active role in Engineers Week for the last 12 years. Why not volunteer an hour of your time to encourage the youth of today to become the engineers of tomorrow? An optional volunteer orientation is scheduled for 5:00 PM on Wednesday, February 8 at the Overlook Room at the CSC. Volunteers get an E-Week T-shirt, free admission, free parking, and a \$2 off coupon for family members.

To volunteer to help with the IEEE table for Engineers Week, just email tom.dionise@ieee.org, and you will be given more details and included in future mailings.



- ***Engineers Week - Robot Car Race***

The Computer Society Chapter of the IEEE Pittsburgh Section is sponsoring the IndEEE 500 cm Robot Car Race at the Carnegie Science Center (CSC) on **Saturday, February 18**. Eighth grade students from local schools use Lego Mindstorm kits and Labview software to build and program their cars. The cars must be programmed to follow an S-shaped curved track to the finish line. The students receive t-shirts, drinks and prizes for their participation. Volunteers are needed to help the students work through construction and programming of their car. Volunteers will be trained on the car the day of the race. Construction begins around 12:00 noon and the race is usually over by 4:30 PM. You may volunteer for all or part of that time. Laptop computers are needed for programming the module. If you are able to help out, please contact Gerry Kumnik at (412) 487-1430 or g.kumnik@computer.org.

- ***Magnetic Resonance Microscopy***

Speaker: Sendhil Velan
Date: Monday, February 20, 2006
Time: 4:00 PM
Place: Room G39, Engineering Sciences Building, West Virginia University
Sponsor: Upper Mon Subsection
Contact: Dr. Dimitris Korakakis, (304) 293-0405 x2512

Abstract: Nuclear Magnetic Resonance (NMR) exploits the interaction of nuclei with magnetic fields. A strong static field is applied to polarize the nuclear magnetic moments, time-dependent RF fields are used to stimulate the spectroscopic response, and magnetic field gradients are used to obtain spatial resolution. MR Imaging is a non-invasive technique, which is capable of producing images of arbitrarily oriented slices through optically nontransparent objects. This technique uses RF pulses along with external magnetic field gradients to encode spatial information into an NMR signal, and then decode the signal to obtain an image. Biological tissues, plants, foodstuffs and many synthetic materials can be penetrated by RF waves, and the signal is hardly attenuated by absorption and emission of RF energy at the resonance frequencies of the nuclear spins. Although nuclear magnetic resonance imaging is well known for its utility in clinical imaging where human subjects are imaged at a spatial resolution of the order of mm, its potential applicability to fields such as materials science, medicine, biology and chemical physics is being increasingly recognized due to the development of Magnetic Resonance Microscopic systems that can provide spatial resolution of the order of a few microns. Typical examples for micro-imaging studies are: composite materials; gels; plants; skin tissue; determination of the effect of creams and skin care products; cell aggregations; drying/dehydration processes; food; polymers and biopolymers (rheology); car tires; micro-electronic components; and chromatographic columns.

- ***Random Coding Bounds on Concatenated Space-Time Transmission over MIMO Multiple Access Systems***

Speaker: Dr. Heung-No Lee, University of Pittsburgh
Date: Friday, February 24, 2006
Time: 10:30 - 11:00 AM Welcome and coffee
11:00 - 12:00 Noon Presentation
Place: Room 404, IS Building, 135 N Bellefield Avenue, Pittsburgh PA 15213
Sponsor: Communications Society Chapter
Contact: Dr. Prashant Krishnamurthy at prashant@tele.pitt.edu or (412) 624-5144

Abstract: Union upper bound and error exponent (cutoff rate) expressions for transmission of block codes over MIMO multiple access (MA) channels are obtained in closed forms. A series of combinatorial codeword enumeration problems are solved under the assumption of transmission of random block codes. Obtained bounds are meaningful as performance prediction and design tools for future MIMO MA systems in which each user employs a turbo-like block code as the outer code to drive the space-time inner code. The assumption of random outer block codes facilitates a closed-form derivation of the bound at the expense of losing some accuracy. To see

its usefulness as a bound, bounds are compared with extensive system simulation results of a practical multi-user detection (MUD) receiver. The practical MUD receiver employs a turbo-iterative detection and decoding scheme while the transmitter employs the low-density parity-check code as the outer code and the BLAST type space-time transmission scheme as the inner code. The random block coding bounds are shown to match quite well with the simulation results.

About the speaker: Dr. Lee is an assistant professor in the Electrical and Computer Engineering Department at Pitt. Previously he was at HRL Labs, California. He earned his Ph.D., M.S., and B.S. degrees in electrical engineering at the University of California, Los Angeles, in 1999, 1994, and 1993 respectively. His current research focus is on iterative decoding and equalization, cross-layer ad hoc networks, and network information theory.

• ***Consultants Network Meeting***

Date: Tuesday, February 28, 2006
Time: 6:30 PM
Place: Westinghouse Energy Center Directions on page 6.
Contact: George Crawford at (412) 675-9164

If you are a consultant offering engineering services or thinking about becoming one, the IEEE Consultants Network (CN) is for you. Network with other consultants and be included in CN's on-line listing of consultants, which is used by companies in need of consultants. Contact George Crawford for details about February's meeting and to be sent CN emails.

• ***Grounding and Bonding Class***

As a service to our community, the Pittsburgh PES/IAS is sponsoring a full day training session on **Saturday, March 25, 2006** on Grounding and Bonding for IEEE members and non-members. This session will be presented by Joe Tedesco, a regular contributor to EC&M Magazine. This type of course normally costs \$200 to \$400 per person, so take advantage of our much lower charges. IEEE member cost is \$65; non-member fee is \$85. Certified continuing education credits are available for an IEEE processing fee of \$10. The class will be held at the Westinghouse Energy Center. Directions are on page 6. Please send your check payable to 'IEEE Pittsburgh' to Chuck Urso, 5077 Lougean Ave, Pittsburgh, PA 15207. If you have any questions, contact Chuck at curso@llitechnologies.com or (412) 338-0700.

About the speaker: Joe Tedesco is considered one of the nation's foremost Electrical Code experts. He has published major articles in popular magazines like EC&M and CEE News and authored or co-authored books for the International Association Electrical Inspectors (IAEI), the National Fire Protection Association (NFPA), and other publishers. Joe has also served as a Codes & Standards Seminar Specialist and Seminar Manager for the IAEI and Electrical Field Service Specialist for the NFPA. He is a licensed Massachusetts Master and Journeyman Electrician, IAEI Certified Electrical Inspector, and Provider of Home Inspector and Electrician updates for license renewals.

Joe will be discussing the following: Grounding fundamentals; to ground or not to ground; grounding electrical systems; grounding electrical services; service and main bonding jumpers; the grounding electrode system; grounding electrode conductors; bonding enclosures and equipment; equipment grounding conductors; enclosure and equipment grounding; clearing

ground faults and short circuits; grounding separately derived systems; grounding at more than one building or structure; ground fault circuit interrupters; ground fault protection for equipment; grounding and bonding for special locations and conditions; grounding and bonding for electronic equipment; low voltage and intersystem grounding and bonding; and grounding of systems or circuits of 1kV or higher.

2006 Calendar – Meetings of IEEE Pittsburgh Section

	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct
Executive Committee	19 Point Park	16 Point Park	16 U Pitt Greensburg							
Section		18 Engr Week table		Date TBD History Dinner						
Communi- cations		24 Random coding bounds								
Computer	18 Tour SunGard	18 Robot Race								
EMBS		15 Topic TBD								
EMCS	31 FAQs	1 Path of Least Induc &EMF phobia								
PES/IAS	25 P.E. License	13 Power Quality	25 Grounding course					Date TBD Pirate game		
Magnetics										
Robotics										
Signal Processing	9 Sensor Network									
Upper Mon		6 Interconn to Backplan 13 Nano photovolt. 20 Magnet Reson Microscopy								
Consultants Network	24 Expand business	28 Topic TBD								
Life Member GOLD										
PACE				Date TBD Engrs as attys	Date TBD MBA Programs	Date TBD Personal Finances		Date TBD Resume preparation		Date TBD Transition to mgmt
Student Activities										

TBD means ‘to be determined’