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Southern Minnesota Section Newsletter

Published by the Southern Minnesota Section of the Institute of Electrical and Electronic Engineers *September 2006*

Up-Front EMC Design
Who Has the Time? (Who Doesn't!)

Monday, September 18th, 6:30 pm
Mayo Medical Sciences Building
(321 3rd Avenue SW, Rochester)

► Pizza at 6:30; Meeting at 7:00 ◄

Sponsored by:
The Southern Minnesota Section IEEE Joint Chapter
Communications, Control Systems and Signal Processing

As product development schedules shorten and become increasingly cost sensitive, up-front Electromagnetic Compatibility (EMC) design is becoming much more important. Gone are the days where we can afford to "fix it in the box". As a result, EMC design and simulation has become a hot topic in recent years. In fact, at the most recent IEEE EMC symposium, 40% of topics dealt with up-front EMC design, while a meager 5% dealt with the traditional methods of "fixing" EMC problems (e.g. shielding, ferrite, gasketing).

Unfortunately, many product development groups find it difficult to fund a dedicated EMC design engineer. As a result, EMC software tools are becoming more attractive to the "every day designer" who has a minimum of knowledge of EMC phenomena. As these tools become increasingly more powerful, they also can become increasingly more "dangerous", potentially providing a design engineer with unneeded-- or worse, incorrect-- recommendations.

IBM has been developing full-wave electromagnetic modeling tools since the early 1980's, most recently focusing on tools that can identify potential EMC problems in printed circuit board designs. I will describe my preferred EMC design process and a few of the most important "rules" that I believe every electrical designer should know.

Mr. Drew Frana is an advisory engineer in Electromagnetic Compatibility (EMC) design and is coordinator of IBM Rochester's EMC Design and Verification laboratory. He has worked on the design of many different information technology products, including servers, hard disk drives, commercial handheld computers, wearable PC, and specialized portable medical and military computers. He has been instrumental in the development of IBM's commercially available suite of electromagnetic phenomena modeling and predictor tools, and is an active member of the IEC Special Committee, CISPR/A Working Group 2, which develops international standards on EMC measurement methods and calculating uncertainty in EMC measurements. Prior to his hire with IBM in 1997, he worked for Motorola as a support engineer for a manufacturing facility building two-way radios. Mr. Frana has a B.S. in Electrical Engineering from Iowa State University.

Nominations for Section Officers

Nominations for Chair, Vice-Chair, Secretary, and Treasurer of our section are now being accepted and will remain open until Tuesday, October 31st. Elections will be held during the November Section meeting (tentatively set for Monday, November 13th).

If you're interested in any of these positions, please contact Scott Dahl (nominations committee chair *ssdahl@us.ibm.com*) or Ron Jensen (membership chair *r.jensen@ieee.org*).

Distinguished Lecturer
Michael B. Pursley,
Holcombe Professor, Clemson University

Wednesday, September 27th, 6:30 pm
Mayo Medical Sciences Building
(321 3rd Avenue SW, Rochester)
REMOTE Live Meeting at Mankato State University
contact: Dave at dpaulsen@ieee.org

► Pizza at 6:30; Meeting at 7:00 ◄

Protocols for Adaptive Modulation and Coding in Dynamic Spectrum Access Networks

A protocol suite is presented for controlling transmissions in dynamic spectrum access networks. A framework is provided for the selection of the initial modulation to be used in a session after a frequency band has been designated. During the first few packet transmissions in a new session, a power-adjustment protocol compensates for uncertainties in the propagation characteristics and interference in the designated frequency band. Throughout the session,the error-control code is adapted to time-varying interference and propagation loss. Because increases in transmitter power can disrupt other sessions that are underway in the network, the transmitter power is increased only if adaptive coding cannot compensate fully for deteriorations in the channel conditions. Protocol performance results are provided for static channels with unknown characteristics and for dynamic channels that are modeled as finite-state Markov chains. Comparisons with Shannon capacity limits are employed to assess the efficiency of the adaptive coding protocol for a wide range of modulation techniques and channel models.

Michael B. Pursley received the B.S. degree with highest distinction in 1967 and the M.S. degree in 1968, both in electrical engineering from Purdue University. He was with the Space and Communications Group of the Hughes Aircraft Company during 1968–74. He received the Ph.D. degree in electrical engineering in January 1974 from the University of Southern California, where he was a Howard Hughes Doctoral Fellow.

In 1974, Dr. Pursley joined the Department of Electrical and Computer Engineering at the University of Illinois, Urbana-Champaign, where he was promoted to the rank of Professor in 1980. Since 1992, Dr. Pursley has held the Holcombe Endowed Chair in Electrical and Computer Engineering at Clemson University, Clemson, South Carolina. His research is in the general area of wireless communications with emphasis on spread-spectrum communications, applications of error-control coding, adaptive protocols for packet radio networks, and mobile wireless communication networks. He is the author of two textbooks published by Prentice Hall: Random Processes in Linear Systems (2002) and Introduction to Digital Communications (2005).

Dr. Pursley was elected Fellow of the IEEE in 1982 and he was elected President of the IEEE Information Theory Society in 1983. He was a member of the Editorial Board of the Proceedings of the IEEE during 1984–91. He is currently a member of Editorial Advisory Board for the International Journal of Wireless Information Networks, a Senior Editor of the IEEE Journal of Selected Areas in Communications, and a Distinguished Lecturer for the IEEE Communications Society. In 2005, he received a distinguished alumnus award from the University of Southern California. He was awarded an IEEE Centennial Medal in 1984, the Ellersick best paper award in 1996, the MILCOM Award for Technical Achievement in 1999, and an IEEE Millennium Medal in 2000. He received the IEEE Communications Society Edwin Howard Armstrong Achievement Award in 2002.

IEEE Tech Insider Webcasts

If you are an engineer or technology professional, check out IEEE Spectrum Online's new series of Webcasts for people who want to know what's happening in today's hottest technology fields. Leading industry experts will explore important technology developments and trends. Watch for these upcoming Webcasts:

- Tech Insider: Car Talk about MEMs: 21 September
- IEEE Spectrum Online Career Accelerator Forum: 12 October
- Medical Technology Gets a Shot in the Arm: 24 October
- The EDA Challenge-Design Automation and Convergence: 9 November
- Mobile Devices and Their Impact on Network Security: 7 December

A live Q&A following each Webcast will give you the opportunity to ask questions. Learn more and register at:

http://www.spectrum.ieee.org/webcasts

Helping the Kids, and Ourselves

"Nearly all recent surveys of science and mathematics curricula in our secondary schools paint a picture of gloom and doom. A cross section of high school curricula and faculty taken across the United States reveals a lack of consistency in both the number and quality of courses." That was written 20 years ago and is still pertinent today. For the remainder of this article, visit:

http://www.todaysengineer.org/2006/Aug/backscatter.asp

IEEE Job Site

Electrical, electronics, computer and other electro technology and information-technology professionals! Find your next great job through the IEEE Job Site! Search the job listings by technical area, title and location and find the next rung on your career ladder. For more information, visit: http://careers.ieee.org/

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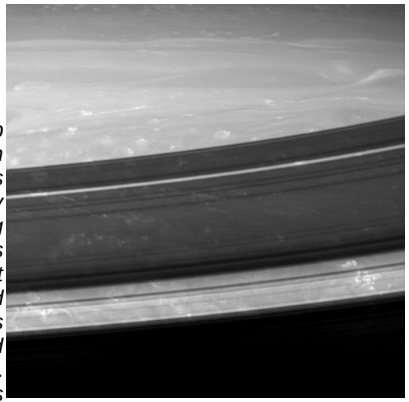
Movement in the Shadows



December 12, 2005
A gorgeous close-up look at the Saturnian atmosphere reveals small, bright and puffy clouds with long filamentary streamers that are reminiscent of the anvil-shaped Earthly cirrus clouds that extend downwind of thunderstorms. Dark ring shadows hang over the scene while the planet rotates beneath.

For more information visit: http://saturn.jpl.nasa.gov"

Credit: NASA/JPL/Space Science Institute