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Workshop on electromagnetic transients in power systems

Hermann Dommel
UBC

Friday 25 September 2015
830 am — 500 pm
British Columbia Institute of Technology (BCIT)
Room Nc: SW01-2019
3700 Willingdon Ave, Burnaby, BC

IEEE student members $60
IEEE members $80
Non-member guests $100
Total seats 50

Registration cut-off: Tuesday 22 September 5 pm
Register online to reserve your seat at

https://meetings.vtools.ieee.org/m/35492

Breakfast, lunch, tea-coffee refreshments provided
Participants will receive a course completion certificate signed by Dr. Dommel, Chapter and Section representatives

Workshop details

Modern methods for microwave filter synthesis

Richard Cameron
ComDev Europe

IEEE MTT-S Distinguished Lecturer

Friday 25 September
4:00 - 5:00 pm

Room 418
MacLeod Building
UBC

Preregister by contacting
Prof. Dave Michelson,
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Information
Joint Aerospace and Electromagnetics Chair
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Up until the early 1970s, nearly all filter synthesis techniques were based upon the extraction of electrical elements (lumped capacitors and inductors, transmission line lengths) from the polynomials that represented the filter's electrical performance in mathematical terms. This was perfectly adequate for the technologies and applications that were current at the time, and many important contributions were made to the art of advanced filter transfer and reflection polynomial generation, and then their conversion to electrical component values corresponding to the filter technologies that were then available.

In the early 1970s a revolution in telecommunication systems and available technology was taking place. The first satellite telecommunication systems were in operation and demand for their services was growing enormously. The crowding of the available spectrum meant that the specifications on channel filters in terms of in-band linearity (group delay, insertion loss) and out-of-band selectivity (high close-to-band rejection, and for transmit filters lowest possible insertion loss), were getting ever more demanding.

During this period some important advances were made in the art of filter network synthesis. Central to these was the coupling matrix representation of the microwave filter electrical network. The coupling matrix synthesis method offers some important advantages over the classical synthesis methods - one of these is the one-to-one correspondence between the elements of the coupling matrix and the individual physical components of the filter. Another advantage is the ability to reconfigure the coupling matrix through similarity transforms to arrive at a different coupling topology, corresponding to the available coupling elements of the particular microwave structure that has been selected for the application. The coupling matrix will naturally accommodate asymmetric characteristics, and those incorporating special features such as transmission zeros or group delay equalization, or both. All these features are critical for meeting the stringent specifications of today's microwave systems.

The lecture for the DML tour will focus on the coupling matrix and the many opportunities for advanced microwave filter design that it opens up. Although there are a number of commercial software tools available for the design of such filters, they are often applied without proper understanding of the fundamentals involved or awareness of alternative designs better suited to the specifications in hand, resulting in a device which is sub-optimal in terms of electrical and mechanical performance. The younger upcoming designers tend to rely on these packages, largely due to a scarcity of reference works and journal articles on the subject of modern filter network synthesis methods.

The DML lecture will aim at bringing these state-of-the-art filter synthesis methods to microwave equipment designers, presenting the possibilities that have now become available for meeting the very stringent specifications that are demanded by modern telecommunication, broadcast, radar and scientific/earth observation satellite systems. The lectures will be presented in a style that minimizes mathematics and jargon as far as possible in order to appeal to multi-discipline audiences.

Speaker: Richard Cameron gained his BSc in Electronics with Telecommunications at the University of Loughborough in 1969. He subsequently joined the Marconi Space and Defence Company to begin a career devoted to the design and R&D of microwave equipment and systems for spacecraft and associated ground stations.

In 1975 Professor Cameron joined The European Space Research and Technology Establishment (ESTEC), the technical branch of the European Space Agency (ESA) based in the Netherlands. Here he was involved in the development of software for the design of advanced microwave equipment for space application, particularly microwave filters. He was also responsible for the monitoring of contracts for microwave equipment for telecommunications, radar (earth observation), scientific, TV broadcast and inter-orbit relay spacecraft. In addition he delivered several lecture series on the computer-aided design of microwave filters to national space agencies.

In 1984 Prof. Cameron joined the ComDev company of Canada to assist in the establishment of the European branch of ComDev - ComDev Europe - based near London, England. This involved laying down the design foundations for the production of passive microwave devices and sub-systems for space application, and later for cellular communication systems. As the company grew, activities tended towards technical management and improving CAD methods for both ComDev in Europe and in Canada.

Prof. Cameron retired from CDE in 2005, but retained a consultancy role with the Company on an ad hoc basis. Since retirement he has conducted several short lecture series for undergraduate and post-graduate students in Hong Kong and the UK. He has also been appointed a Visiting Professor at the University of Leeds.

During his career Prof. Cameron has filed 8 patents and has authored or co-authored many papers for technical journals and conferences. He is also the co-author of a technical book, Microwave Filters for Communication Systems - Fundamentals, Design and Applications

Ahmed H. Tewfik
University of Texas

Monday 21 September
3:30 — 05:30PM

Room 202
MacLeod Building
2356 Main Mall
UBC

Information
Signal Processing Chair
Ivan Bajic
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The role of information acquisition in human intelligence amplification

Decades of research indicate that humans are not rational decision-makers. Our decisions and assessments of situations we encounter and other individuals or groups are sometimes flawed because they are based on a limited acquisition and rational analysis of information, and strongly influenced by our past experiences. The outcomes of decisions negatively impacted by cognitive biases affect individuals, businesses and society. Their impacts can be temporary and mildly annoying, such as buying an unneeded or wrong tablet or triggering an unwarranted fight with a spouse, or long term and costly, such as marrying the wrong person, wrong product or business decision, or creating an environmental disaster.

In this talk we review the evidence of cognitive biases in human decision making. We then discuss an emerging mathematical theory of man-machine symbiosis and intelligence amplification. Optimal man machine symbiosis produces better outcomes than those produced by man alone or machine alone. We highlight the challenges that must be solved for optimal man machine symbiosis, formulate solutions to these challenges and conclude with descriptions of initial successes.

Speaker: Ahmed H Tewfik received his B.Sc. degree from Cairo University, Cairo Egypt, in 1982 and his M.Sc., E.E. and Sc.D. degrees from MIT, in 1984, 1985 and 1987 respectively. He is the Cockrell Family Regents Chair in Engineering and the Chairman of the Department of Electrical and Computer Engineering at the University of Texas Austin. He was the E. F. Johnson professor of Electronic Communications with the department of Electrical Engineering at the University of Minnesota until September 2010.

Dr. Tewfik worked at Alphatech, Inc. and served as a consultant to several companies. From August 1997 to August 2001, he was the President and CEO of Cognicity, Inc., an entertainment marketing software tools publisher that he co-founded, on partial leave of absence from the University of Minnesota. His current research interests are in cognitive augmentation through man-machine symbiosis and mobile computing, medical imaging and brain computing interfaces.

Prof. Tewfik is a Fellow of the IEEE. He was a Distinguished Lecturer of the IEEE Signal Processing Society in 1997 - 1999. He received the IEEE third Millennium award in 2000. He was elected to the position of VP Technical Directions of the IEEE Signal Processing Society in 2009 and served on the board of governors of that Society from 2006 to 2008. He has given several plenary and keynote lectures at IEEE conferences

IEEE Signal Processing Society

Upcoming IEEE conferences in Vancouver area

6th Internat'l Conference & Workshop
on Computing and Communication
15 - 17 October 2015
Vancouver BC
http://www.iemcon.org/

IEEE 7th International Conference
on Cloud Computing Technology and Science
30 Nov - 03 Dec 2015
Vancouver BC
http://2015.cloudcom.org/

16th ACM/IFIP/USENIX International
Middleware Conference
08 - 11 December 2015
Vancouver BC
http://2015.middleware-conference.org/

Agile Vancouver Events
Sponsored by IEEE Vancouver Joint Computing Chapter

We're Building What, When? Managing Change in UX Design

Date: Monday, September 21st, 2015
Time: Networking starts at 6pm, presentation starts at 6:30pm
Place: Hootsuite at 5 E 8th Ave in Vancouver
Website: http://agilevancouver.ca/index.php/events-in-2015/we-re-building-what-when
Registration: http://www.meetup.com/Agile-Vancouver/events/224749436/ (free, need to RSVP)

Our first meeting of the 2015-2016 season is with Su-Laine Brodsky, a local user experience practitioner and contractor. This will be our first meeting at the offices of Hootsuite. User experience design methods can dramatically improve a product, but it is not immediately obvious how to make them fit into Agile projects. Successfully integrating UX designers into Agile software development can require adaptations across the team in both process and culture.

Much Ado About Agile X

Date: Monday, October 26th, for the conference and Tuesday, October 27th, for tutorials
Time: The conference starts at 8:30 am and tutorials start at 9 am.
Place: Sutton Place Hotel on Burrard
Website: http://agilevancouver.ca/index.php/events-in-2015/2015-much-ado-about-agile-x
Registration: http://www.eventbrite.ca/e/much-ado-about-agile-2015-general-registration-tickets-18090489140.

2015 marks a significant achievement for the Vancouver Agile Methods Users Group. Agile Vancouver, as the group is more widely known, has been following its mandate of "educating its members, sharing experiences, promoting Agile approaches in the local BC software industry, and fostering academic and industrial research" since it's inception in 2005, and having a great time doing it. This year will be our 10th Much Ado About Agile conference.

To commemorate the anniversary, we have invited Philippe Kruchten back to deliver the keynote speech. This year's speaker lineup has a lot of new faces in it, some local and some not, including Jennifer Fawcett, Mark Lines, Adrian Moise, James Shore, Byron Packwood, Ardita Karaj, and Jeff Morgan. As has become our custom, we will be wrapping up the conference by having a Panel Discussion with all the speakers. There are three full-day tutorials to choose from: "Lean Software Delivery" with Matt Heusser, "Bringing Fluency to your Agile teams: Coaching for Best-Fit Agile" with James Shore, and "Disciplined Agile Delivery in a Nutshell" with Mark Lines.

Course Summary

Electromagnetic transient phenomena in power systems may be caused by external events such as lightning, or by internal events such as switching operations and faults. It is important to understand these transients so that protective measures can be taken to prevent equipment failures. They can easily be simulated with commercially available software nowadays. This one-day course will provide an overview of electromagnetic transients in power systems. It is not a training seminar for a particular software package.

Course Content

I. Overview of EMTP-Type Computer Solution Methods for Electromagnetic Transients in Power Systems

- Introduction
- Per-unit versus actual quantities
- Basic transients solution method
- Accuracy
- Inclusion of line losses
- Extension to coupled lumped elements
- Extension to “balanced” multiphase lines
- Frequency-dependent line parameters
- Untransposed transmission lines
- Nonlinear elements
- Numerical oscillations
- Examples
- Real-time simulators
- EMTP-type software

II. Overhead Line Parameters

- General approach
- Series impedance
- Shunt capacitance
- Full N*N matrices
- Reduced matrices for phase conductors
- M-phase nominal Π-circuits
- Examples for untransposed line analysis
- Equivalent conductors for bundles
- Perfectly transposed three-phase line
- Positive and zero sequence impedances
- Lossless high frequency approximation
- Geometric mean distances
- Electric field close to overhead lines
- Magnetic field close to overhead lines
- Geomagnetically induced currents

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III. Underground Cables

- Basic electrical characteristics
- Shunt capacitances
- Series impedances
- Typical studies
- Electrically short cables

IV. Transformers

- What is needed in transformer representations
- Transformer models
- Special connections
- Current transformer saturation
- Inrush current
- Ferroresonance
- Appendix 1. Wye-zigzag transformer
- Appendix 2. Ungrounded-neutral systems
- References

V. Sources and Electric Machines

- Ideal sources (either voltage or current sources)
- Simple model for synchronous and induction machine
- Detailed model for synchronous machine
- Detailed model for induction machine
- Modelling advice

VI. Switching Studies

- Closing and re-closing operations on transmission lines (line energization)
- Reduction of overvoltages in closing and re-closing operations on transmission lines
- Computer models for closing and re-closing operations on transmission lines
- Examples for closing and re-closing operations on transmission lines
- Example for temporary overvoltages
- Examples for subsynchronous resonance
- Example for single-line-to-ground fault on transmission lines
- Example for transient recovery voltage
- Example for linear resonance after opening a transmission line in parallel with another line
- Examples for steady-state coupling between parallel transmission lines
- Capacitor switching
- Interruption of small inductive currents

Dr. Hermann Dommel is known for his work on electromagnetic transients in power systems. He is currently Professor Emeritus at the University of British Columbia in Vancouver, Canada. Prior to joining the University in 1973, he worked for Bonneville Power Administration in Portland, Oregon, USA, on various computer programs, including what became known as the EMTP. He has taught short courses on electromagnetic transients for utilities and universities around the world. He is a Life Fellow of IEEE. From 1995 to 2000 he held the Industrial Research Chair sponsored by B.C. Hydro and the Natural Sciences and Engineering Research Council of Canada.