

IEEE KITCHENER-WATERLOO

SECTION PRESENTATION

Professor John W. Bandler

McMaster University & Bandler Corporation

" SPACE MAPPING: ENGINEERING MODELING AND OPTIMIZATION EXPLOITING SURROGATES "

Abstract:

The space mapping approach to engineering model enhancement and design optimization intelligently links companion “coarse” (ideal or low-fidelity) and “fine” (practical or high-fidelity) models of different complexities. Examples include full-wave electromagnetic (fine) simulations with empirical circuit-theory based (coarse or surrogate) simulations, or an engineering device under test coupled with a suitable simulation surrogate. Our methodology has been adopted for diverse design applications: electronic components, magnetic systems, civil and mechanical engineering structures. Space mapping facilitates efficient optimization while avoiding direct optimization of the fine model. It is a simple CAD methodology, which closely follows the traditional experience and intuition of engineers, yet is amenable to rigorous mathematical treatment. Following the original concept of Bandler in 1993, algorithms have utilized Broyden updates, trust regions, and artificial neural networks. New developments include (1) implicit space mapping, in which we allow preassigned parameters not used in optimization to change in the coarse model, and (2) output space mapping, where a transformation is applied to the response of the model. We present illustrative examples such as the cheese-cutting problem, and new results applicable to RF, wireless and microwave circuit design, integrating electromagnetic simulations.

Biography: Please see attached

DATE: Monday October 6, 2003

TIME: 5:00 pm

LOCATION: DC 1302, University of Waterloo Davis Centre

**ALL ARE WELCOME!!
Refreshments will be served
Invited by Professor Raafat Mansour**

Biography:

John W. Bandler (S'66, M'66, SM'74, F'78) was born in Jerusalem, on November 9, 1941. He studied at Imperial College of Science and Technology, London, England, from 1960 to 1966. He received the B.Sc.(Eng.), Ph.D. and D.Sc.(Eng.) degrees from the University of London, London, England, in 1963, 1967 and 1976, respectively.

He joined Mullard Research Laboratories, Redhill, Surrey, England in 1966. From 1967 to 1969 he was a Postdoctorate Fellow and Sessional Lecturer at the University of Manitoba, Winnipeg, Canada. Dr. Bandler joined McMaster University, Hamilton, Canada, in 1969. He has served as Chairman of the Department of Electrical Engineering and Dean of the Faculty of Engineering. He is currently Professor Emeritus in Electrical and Computer Engineering, directing research in the Simulation Optimization Systems Research Laboratory. He is a member of the Micronet Network of Centres of Excellence.

Dr. Bandler was President of Optimization Systems Associates Inc. (OSA), which he founded in 1983, until November 20, 1997, the date of acquisition of OSA by Hewlett-Packard Company (HP). OSA implemented a first-generation yield-driven microwave CAD capability for Raytheon in 1985, followed by further innovations in linear and nonlinear microwave CAD technology for the Raytheon/Texas Instruments Joint Venture MIMIC Program. OSA introduced the CAE systems RoMPE™ in 1988, HarPE™ in 1989, OSA90™ and OSA90/hope™ in 1991, Empipe™ in 1992, Empipe3D™ and EmpipeExpress™ in 1996. OSA created the product *empath*™ in 1996 which was marketed by Sonnet Software, Inc., USA. Dr. Bandler is President of Bandler Corporation, which he founded in 1997.

Dr. Bandler was an Associate Editor of the IEEE Transactions on Microwave Theory and Techniques (1969-1974), and has continued serving as a member of the Editorial Board. He was Guest Editor of the Special Issue of the IEEE Transactions on Microwave Theory and Techniques on Computer-Oriented Microwave Practices (1974) and Guest Co-Editor of the Special Issue of the IEEE Transactions on Microwave Theory and Techniques on Process-Oriented Microwave CAD and Modeling (1992). He joined the Editorial Boards of the International Journal of Numerical Modelling in 1987, the International Journal of Microwave and Millimeterwave Computer-Aided Engineering in 1989, and Optimization and Engineering in 1998. He was Guest Editor, International Journal of Microwave and Millimeter-Wave Computer-Aided Engineering, Special Issue on Optimization-Oriented Microwave CAD (1997), and Guest Editor, IEEE Transactions on Microwave Theory and Techniques, Special Issue on Automated Circuit Design Using Electromagnetic Simulators (1997). He is Guest Co-Editor, Optimization and Engineering Special Issue on Surrogate Modelling and Space Mapping for Engineering Optimization (2001). He is Guest Co-Editor, IEEE Transactions on Microwave Theory and Techniques, Special Issue on Electromagnetics-Based Optimization of Microwave Components and Circuits (2004). He has served as Chair of the MTT-1 Technical Committee on Computer-Aided Design.

Dr. Bandler has published more than 355 papers. He contributed to Modern Filter Theory and Design, Wiley-Interscience, 1973 and to Analog Methods for Computer-aided Analysis and Diagnosis, Marcel Dekker, Inc., 1988. Four of his papers have been reprinted in Computer-Aided Filter Design, IEEE Press, 1973, one in each of Microwave Integrated Circuits, Artech House, 1975, Low-Noise Microwave Transistors and Amplifiers, IEEE Press, 1981, Microwave Integrated Circuits, 2nd ed., Artech House, 1985, Statistical Design of Integrated Circuits, IEEE Press, 1987 and Analog Fault Diagnosis, IEEE Press, 1987.

Dr. Bandler is a Fellow of the Canadian Academy of Engineering, a Fellow of the Royal Society of Canada, a Fellow of the Institution of Electrical Engineers (Great Britain), a Fellow of the Engineering Institute of Canada, a Member of the Association of Professional Engineers of the Province of Ontario (Canada) and a Member of the MIT Electromagnetics Academy. He received the Automatic Radio Frequency Techniques Group (ARFTG) Automated Measurements Career Award in 1994.