



## Conferencias Magistrales

El Doctorado en Ciencias de la Ingeniería del ITESO, Universidad Jesuita de Guadalajara, en colaboración con la Sección Guadalajara del IEEE, y el Capítulo México de la MTT-S, invitan cordialmente a la conferencia magistral:

## SPACE MAPPING: AN ENGINEERING DESIGN TECHNOLOGY THAT MIMICS COMMON SENSE

by Prof. John W. Bandler

### SYNOPSIS

Space mapping, now in its twentieth year of development and exploitation, is an engineering design technology that fully exploits the engineer's traditional "quasi-global" intuition. Through suitable physics-based surrogates, space mapping facilitates design optimizations with high-fidelity or "fine-model" simulation accuracy but with "coarse-model" simulation speed. It implements the iterative enhancement of surrogates derived from simple mappings of coarse models to realize highly accurate surrogates of corresponding fine models. Importantly, space mapping offers a quantitative explanation for the engineer's mysterious "feel" for a problem. Because its characteristics parallel contemporarily understood aspects of how the brain carries out certain tasks, we assert that space mapping technology mimics "common sense."

Here, we introduce the concept, recall important advances, draw parallels with everyday human experience, indicate the current state of the art, and provide illustrations from various engineering disciplines, including electromagnetics-based microwave device modeling and design optimization. Aggressive space mapping, the most widely used technique, efficiently invokes inner loops of conventional optimization—common sense at work—often yielding excellent results in an acceptable two or three iterations. Design illustrations include the optimization of a 10-channel output multiplexer involving 140 optimization variables, the optimization of a microwave hairpin filter using implicit space mapping, and tuning space mapping of an open-loop ring resonator bandpass filter.



John W. Bandler 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 McMaster University, Canada, in 1969. He is now a Professor Emeritus.

John founded Optimization Systems Associates Inc. in 1983 and sold it to Hewlett-Packard in 1997. He is President of Bandler Corporation.

He has published more than 480 technical papers. He is a Fellow of several societies, including the IEEE, the Royal Society of Canada and the Canadian Academy of Engineering.

In 1994, he introduced space mapping, a concept that has since been adopted by design portfolios across the entire spectrum of engineering, making possible the high-fidelity design of devices and systems at a cost of only a few high-fidelity simulations. Space mapping explains in common sense terms the mysterious "feel" that engineers have claimed as special to their engineering expertise.

As well as being an engineer, professor, innovator, researcher, and an author of technical papers, John is active in artistic endeavors. He has authored fiction and non-fiction, including a screenplay and nine stage plays. Three of his plays have been performed, one of which he directed himself. In 2012 he gave a rump session on "Human aspects of communication and persuasion: first impressions and subtext" at the IEEE MTT-S International Microwave Symposium; a video is available on IEEE.tv.

John received the 2004 IEEE MTT-S Microwave Application Award. In 2012, he received the Queen Elizabeth II Diamond Jubilee Medal and the 2012 IEEE Canada McNaughton Gold Medal, which honors "outstanding Canadian engineers recognized for their important contributions to the engineering profession." In 2013, he received the IEEE MTT-S Microwave Career Award "For a career of leadership, meritorious achievement, creativity and outstanding technical contributions in the field of microwave theory and techniques."

<http://www.sos.mcmaster.ca>

<http://www.bandler.com>

**Jueves 12 de septiembre: 18:00 a 19:30 horas. ITESO, Auditorio W (Edificio W, Planta Baja).**

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