



Frank Maiwald MLA/SFV MTT-S Chapter Chair
Frank.Maiwald@IEEE.org or Frank.Maiwald@jpl.nasa.gov
MTT-S chapter within Metro Los Angeles and San Fernando Valley Sections

MTT-S Distinguished Microwave Lecture,
May 13, 2009
MLA/SFV MTT-S Chapter

Location: California Institute of Technology, Room: Moore Lab Building, room 080
(basement), Pasadena, CA
Maps: <http://www.admissions.caltech.edu/visiting/getting-here>
Time: 7:00pm (dinner starts from 6:30pm)
Cost: \$10 for members, students are free.
RSVP by May 1, 2009 and send your e-mail confirmation to
Frank.Maiwald@IEEE.org with Subject: "DML May 13, 2009 reservation".
Lecture:

PRACTICAL ASPECTS OF MICROWAVE FILTER DEVELOPMENT

By
Dr. Richard V. Snyder
RS Microwave
Butler, NJ 07405

The design and development of microwave filters and networks proceeds from strong theoretical underpinnings, with readily-available theory (and software) covering such diverse areas as circuit topology, electromagnetic radiation and coupling, thermal and mechanical properties of materials, mechanical resonances and finish characteristics.

Given all of the available theory, it falls upon the developer to properly apply relevant portions of this wide-ranging chest of knowledge, with an artistic touch (the "black-magic" aspect of design), with constant awareness of the situational constraints upon economics that differentiate between science and engineering in the real world.

A wonderful tool that has developed over the last decade is the artful use of simulation tools to substitute for earlier lab-based cut and try. In a development mode, the designer is usually faced with having to achieve performance that is just marginally possible. This is because the users of filters and networks are also rather good at simulating what can be done, and consequently write requirements with almost no margin. It is thus important for designers to be more sophisticated in the use of available tools and to develop ever-better models for analysis and prediction, as well as new syntheses not available (yet) to the specification writer. This will save the designer from worrying about performance, after investing days, weeks or months in design of something that really cannot quite do the job, at room ambient conditions or over some range of temperature, altitude, humidity, high power, etc..

In this talk, I will present examples showing how simulation tools have been used to eliminate lab cut-and-try (multiple prototypes) and to squeeze the last gasp of performance out of certain filters. The simulation tools can be applied to mechanical parameters, such as shock and vibration, as well as to the fundamental electrical network design. Examples of high power bandpass, high power notch filters with wide stopbands, and notch filters with

wide passbands will be presented. We will present the idea of validating models to ensure that sufficient model complexity is contained so as to enable accurate predictions. It is hoped that the listener will develop an appreciation for the cost-savings associated with the idea of using well-validated simulation models in lieu of the lathe (and other tools).



Richard V. Snyder Bio

Richard V. Snyder is President of RS Microwave (Butler, NJ, USA), author of 71 papers, three book chapters and holds 18 patents. His interests include E-M simulation, dielectric and suspended resonators, high power notch filters and active filters. He received his BS, MS and PhD degrees from Loyola-Marymount, USC and PINY. Dr. Snyder served the IEEE North Jersey Section as Chairman and 14 year Chair of the MTT-AP chapter. He is currently Chair of the IEEE North Jersey EDS and CAS chapters. He twice received the Region 1 award. In January 1997 he was named a Fellow of the IEEE and is now a Life Fellow. In January 2000, he received the IEEE Millennium Medal. Dr. Snyder served as General Chairman for IMS2003, in Philadelphia. In January 2007, he began a second 3-year term as an elected member of ADCOM. Within the ADCOM, he serves as Chair of the TCC and Chair of the Standards Committee. He is an Associate Editor for the IEEE Transactions on Microwave Theory and Techniques, responsible for most of the filter papers submitted. He is a member of the American Physical Society, the AAAS and the New York Academy of Science.

A reviewer for IEEE-MTT publications and the MWJ, Dr. Snyder teaches and advises at the New Jersey Institute of Technology. He is a Visiting Professor at the University of Leeds, in the U.K. He is also active in the MTT-S Speaker's Bureau and three ADCOM committees mentioned above. He is serving as an MTT-S Distinguished Lecturer, starting his term in January 2007. He served 7 years as Chair of MTT-8 and continues in MTT-8/TPC .work. He previously was Chief Engineer for Premier Microwave.