



AUTOMATIC RF TECHNIQUES GROUP

NEWSLETTER

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Fall 2009 ARFTG Microwave Measurement Symposium: “System Modeling and Measurement for High Accuracy Verification”

OVERVIEW



The snow covered Rocky Mountains provided a picturesque backdrop for the Fall 2009 ARFTG Symposium

Freezing temperatures and a deep covering of snow greeted those that attended the Fall 2009 ARFTG Microwave Measurement Symposium that took place at the Omni Interlocken Resort, in Broomfield, Colorado, from Tuesday, December 1st, to Friday, December 4th. However, the cold temperature outside was offset by a decidedly warm atmosphere inside, as colleagues, both old and new, began interacting on all things “microwave” in a characteristic ARFTG fashion. Yes, those that ventured to this region near the snow covered Rocky Mountains were treated to a truly quintessential experience that is only likely to be found at events

hosted by ARFTG. This year’s Symposium consisted of a training course, a workshop, a users’ forum, a conference and a visit to the nearby laboratories of the National Institute of Standards and Technology (NIST) in Boulder. The theme of the Symposium was “System Modeling and Measurement for High Accuracy Verification” - the ‘main event’ being the 74th ARFTG Microwave Measurement Conference, which took place on Thursday, and Friday morning. However, this was accompanied by four other not-to-be-missed events: the NIST/ARFTG Microwave Measurement Short Course (held on Tuesday, and Wednesday morning), a Nonlinear Measurement Workshop (on Wednesday afternoon); the NVNA Users’ Forum (held on Wednesday evening); a Reception and Awards Banquet; and, a tour of the NIST labs. Taken together, this amounted to four days packed with exciting activities for RF and microwave engineers and technologists with an interest in measurement.

This newsletter gives reviews of these activities. There are also brief accounts of other events of interest to the ARFTG community. To obtain more information on ARFTG and its activities, including details of conferences past, present and future, visit the ARFTG website at www.arftg.org.

SHORT COURSE

The Fall 2009 ARFTG Microwave Measurement Symposium began with the 15th annual NIST/ARFTG Microwave Measurement Short Course. This highly

successful event provides training, given by acknowledged experts in the field, in most areas of interest to today's RF and microwave measurement community.

Day one of this one-and-a-half day course covered the fundamentals of microwave measurement, including measurement of: connectorized and on-wafer S-parameters; power; large-signals; thermal and phase noise. Measurements using high-speed oscilloscopes were also covered during day one of the course. Day two contained lectures that related specifically to the theme of the symposium. These were: measurement uncertainty; uncertainty of complex-valued measurement quantities; uncertainties in on-wafer S-parameter measurements; and, measurement verification. This year, more than 20 people attended the course. For information on ARFTG courses, visit www.arftg.org or contact the ARFTG Short Course Organizer, Dominique Schreurs (dominique.schreurs@ieee.org).



Short course lectures are delivered in an informal atmosphere, encouraging interaction between lecturers and attendees

NONLINEAR MEASUREMENT WORKSHOP

This year's ARFTG Nonlinear Measurement Workshop was organized by Denis Barataud and Jean-Pierre Teyssier (Xlim, France) and was held immediately after the NIST/ARFTG Short Course. The workshop contained talks on the following topics: Pulsed IV and S-parameters for GaN HEMT Compact Models and Loadpull Measurement Setups; Modeling and Characterization of the Field-plate Bias Effects in Si LDMOS FETs; Measuring and Engineering RF Waveforms; Broadband Modulated Measurement with a

Large Signal Network Analyzer; Behavioral Modeling and Predistortion for Power Amplifiers; and, LSNA Calibration-Comparison Method and Software Package.

The workshop was attended by more than 40 people and was a great success. Thanks are due to all those that were involved in the workshop – especially Denis Barataud and Jean-Pierre Teyssier, who did an excellent job as workshop organizers. Suggestions for future topics for workshops should be sent to the ARFTG Workshops Chair, Jean-Pierre Teyssier (teyssier@brive.unilim.fr).

NVNA USERS' FORUM - US

The ARFTG NVNA (Nonlinear Vector Network Analyzer) Users' Forum held a meeting on Wednesday evening, immediately after the Nonlinear Measurement Workshop. On this occasion, approximately 40 people attended this informal meeting that comprised a discussion topic and a research update. The discussion concerned establishing a common file structure for describing frequency-domain nonlinear models, and included a review of the new "OPENWAVE" initiative. The research update, by Patrick Roblin, Ohio State University, gave a tour of the work on nonlinear devices and measurements carried out at Columbus. The Forum organizers were Jean-Pierre Teyssier and Dominique Schreurs. A summary of this meeting will be made available at www.arftg.org.

CONFERENCE TECHNICAL SESSIONS

The 74th ARFTG Microwave Measurement Conference began with an introduction by Ron Ginley, the Conference Chair. Ron thanked Dave Walker, Technical Program Chair, for his help in organizing the conference. Our congratulations go to Ron and Dave for putting together an excellent conference with many interesting papers, with the overall theme "System Modeling and Measurement for high accuracy Verification". The conference received 'gold' sponsorship from Maury Microwave and 'silver' sponsorship from Agilent.

The conference consisted of six sessions, one of which was an interactive session featuring papers given as poster presentations. The other sessions consisted of papers given as oral presentations. All papers have been published in the conference digest CD (copies of which can be ordered from www.arftg.org). On this occasion, over 50 people attended the conference, coming from many different countries around the world - including countries in Europe and the Asia Pacific region.



Poster papers provide an opportunity for detailed discussion on technical matters of interest

Voted by the conference attendees as the best oral paper presentation was, “Verifying Transmission Phase Measurements at Millimeter Wavelengths Using Beadless Air Lines”, by M Horibe¹ and N Ridler² (¹NMIJ, Tsukuba, Japan; ²NPL, Teddington, United Kingdom). The best interactive forum paper presentation was “Generalized Method for Broadband Measurement of Extreme Impedances”, by M Randus and K Hoffmann (Czech Technical University, Prague, Czech Republic). The best exhibitor was voted as Maury Microwave.

CONFERENCE EXHIBITS

The exhibits area gave conference attendees an excellent opportunity to see the latest range of products available from some of the leading suppliers in the RF and microwave test and measurement industry.

The following companies chose to exhibit at this conference:

- Agilent Technologies
- Cascade Microtech
- Maury Microwave Corporation
- Mesuro
- Rohde & Schwarz
- Sonnet Software
- SUSS MicroTec
- Tektronix

To exhibit at future conferences, please contact the ARFTG Exhibits Chair at exhibits@arftg.org.



Conference attendees are given ample opportunity to visit the conference exhibits area

ANNUAL BUSINESS MEETING

The annual ARFTG Business Meeting was held on December 3rd, 2009, during the 74th conference. A significant part of this meeting consisted of electing five members to the ARFTG Executive Committee (ExCom). Biographies for the candidates were distributed prior to voting. The outcome of the voting was the re-election of three existing members of ExCom, Ron Ginley, Nick Ridler and Dominique Schreurs, and the election of two new members of ExCom, Patrick Roblin and Mitch Wallis. ARFTG thanks Dave Walker and Charles Wilker, who chose not to stand for re-election to ExCom, for their valuable contributions to ARFTG whilst members of ExCom.

CONFERENCE AWARDS

ARFTG President, Leonard Hayden, presided over the awards ceremony, which took place during the Awards Banquet, on Thursday evening. Certificates of appreciation were presented to the organizers of the conference, namely: Ron Ginley, Conference Chair and Conference Host; Dave Walker, Technical Program Chair; Dominique Schreurs, Short Course Director; Jean-Pierre Teyssier, Nonlinear Measurement Workshop Organizer; John Wood, NVNA Users' Forum Organizer; Brett Grossman, the ARFTG Exhibits Chair; and, the Conference Session Chairs – Tom Crowley, Jeff Jargon, Blair Hall, Larry Dunleavy, Kate Remley and Dave Walker. Awards were also given for the best oral paper presentation (by Yves Rolain), best interactive forum paper presentation (by J. E. Zuñiga-Juarez) and best exhibitor (Tektronix) from the previous (73rd) conference held in Boston, Massachusetts.

STUDENT FELLOWSHIP

The annual ARFTG Awards Banquet also gave an opportunity to announce the latest recipients of the ARFTG Microwave Measurement Student Fellowship award. The purpose of the fellowship award is to recognize and provide financial assistance to graduate students who show promise and interest in pursuing research related to improvement of RF and microwave measurement techniques. The fellowship award is \$5000. This year, there were *two* successful applicants for this award – Xiaobang Shang (University of Birmingham, UK) and Martin Randus (Czech Technical University in Prague, Czech Republic). Our congratulations go to both Xiaobang and Martin! The next deadline for applications for the fellowship award will be 1st October 2010. Further details can be found at: www.arftg.org.

OTHER RECENT EVENTS: NVNA USERS' FORUM - EUROPE

The NVNA Users' Forum – Europe meeting took place on Wednesday September 30th, during European Microwave Week 2009, in Rome, Italy. The topics presented and discussed included: Large-signal RF Metrology at NPL; Challenges and Future Directions of Large-signal Measurements, with focus on Europe; and, A Measurement Set-up for the Study of Memory Effects in Modern Wireless Systems. A summary of the meeting will be available at www.arftg.org.

FUTURE EVENTS

Summer 2010 ARFTG activities

Microwave Measurement Conference

The 75th ARFTG Microwave Measurement Conference will be held on Friday, May 28th, 2010, in Anaheim, California, as part of Microwave Week 2010, which also includes the IEEE MTT-S International Microwave Symposium (www.ims2010.org) and the Radio Frequency Integrated Circuits symposium (www.rfic2010.org). The theme for the ARFTG conference is "Measurement of Modulated Signals for Communications". For more information, contact the Conference Chair, Ken Wong, (ken_wong@agilent.com), or the Technical Program Chair, John Wood (john.wood@freescall.com). Alternatively, for up-to-date information on the conference, visit www.arftg.org.



The Hilton Anaheim, venue for the 75th ARFTG Microwave Measurement Conference

NVNA Users' Forum - International

The ARFTG NVNA Users' Forum will also hold a meeting during Microwave Week 2010. For more information, please contact the Forum organizers: Dominique Schreurs (dominique.schreurs@ieee.org), Jean-Pierre Teyssier (teyssier@brive.unilim.fr) or John Wood (john.wood@freescall.com).

NVNA Users' Forum - Europe

It is planned to hold a meeting of the ARFTG NVNA Users' Forum during European Microwave Week 2010, which takes place from September 26th to October 1st, in Paris, France. More information on European Microwave Week 2010 can be found at: www.eumweek.com.

Fall 2010 ARFTG Symposium

The Fall 2010 ARFTG Microwave Measurement Symposium will be held in Clearwater, Florida, from Tuesday, November 30th, to Friday, December 3rd. It is planned to hold the 76th ARFTG Microwave Measurement Conference, the NIST/ARFTG Short Course, a Nonlinear Measurement Workshop and the ARFTG NVNA Users' Forum during this symposium. For more information, contact the Conference Chair, Dave Blackham (dave_blackham@agilent.com), or the Technical Program Chair, Jon Martens (jon.martens@anritsu.com). Alternatively, information will also be available, in due course, at www.arftg.org.