



AUTOMATIC RF TECHNIQUES GROUP NEWSLETTER

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FALL 2006 ARFTG MICROWAVE MEASUREMENT SYMPOSIUM *Measurements of High Performance Devices and Applications*

OVERVIEW



*The Washington Marriott Hotel,
venue for the fall 2005 ARFTG activities*

The fall 2005 ARFTG Symposium activities took place at the Washington Marriott Hotel, Washington, from November 29th to December 2nd, 2005. The 'main event' was the 66th ARFTG Microwave Measurement Conference, which took place on December 1st and 2nd. However, this was preceded by three other important meetings: the ARFTG/NIST Microwave Measurement Short Course (held on November 29th and the morning of November 30th), a Nonlinear Measurement Workshop (on the afternoon of November 30th) and the NVNA Users' Forum (held during the evening of November 30th). Taken together, this amounted to almost a whole week of exciting events for RF and microwave measurement specialists.

The following paragraphs review these events in more detail. There are also brief accounts of other activities relevant to the ARFTG community. To obtain more information on ARFTG and its activities, including details of conferences past, present and future, please visit the ARFTG website at www.arftg.org.

SHORT COURSE

The fall 2005 ARFTG Symposium activities began with the 12th annual ARFTG/NIST 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.

The one-and-a-half day course covered microwave measurement fundamentals, including vector network analysis, scattering parameters, power and thermal noise. Practical issues such as cables, fixtures, probes and on-wafer measurements were also included. More advanced measurement topics were also covered, including microwave measurements for optoelectronic applications, scattering parameter uncertainty analysis, electromagnetic compatibility and an overview of wireless instrumentation and nonlinear measurements. On this occasion, a total of 26 people attended the course. Our special thanks to Dave Walker, and the 12 volunteers who made this course possible.

For information on future ARFTG courses, visit www.arftg.org or contact the Short Course Director, Dave Walker (dwalker@boulder.nist.gov) of NIST.

NONLINEAR MEASUREMENT WORKSHOP

The theme for the fall 2005 ARFTG Nonlinear Measurement Workshop was “Broadband Measurements for Wireless Telecommunication Systems”. It was organized by Kate Remley of NIST, Boulder, Colorado, and began with lunch on November 30th, immediately after the ARFTG/NIST Microwave Measurement Short Course.

The workshop addressed issues relating to increasing the measurement bandwidth of instrumentation such as vector signal generators, vector signal analyzers and large signal network analyzers. The workshop was a great success and will be followed by further workshops on nonlinear measurement related topics at future fall ARFTG Symposia. Thanks are due to all those that were involved in the workshop – especially Kate Remley who did an excellent job as workshop organizer.

Suggestions for future workshop topics should be sent to the ARFTG Workshop Coordinator, Dominique Schreurs (dominique.schreurs@esat.kuleuven.ac.be).

NVNA USERS’ FORUM - US

The ARFTG NVNA (Nonlinear Vector Network Analyzer) Users’ Forum held a meeting immediately after the Nonlinear Measurement Workshop. This Forum is an informal discussion group devoted to sharing information and issues relating to instrumentation utilized in vector large-signal network analysis of microwave circuits and systems that contain nonlinear elements.

Specific discussion topics at this meeting included: “Tips and Tricks for Distortion Measurements” and “Frequency- and Time-domain models: how do you choose which one to use?” Current research updates from those working in this field were also given.

A summary of this meeting will be made available at www.arftg.org.

66th CONFERENCE TECHNICAL SESSIONS

The 66th ARFTG Microwave Measurement Conference began with an introduction by Greg Burns, the Conference Chair. Greg then handed the proceedings over to Mohamed Sayed, the Technical Program Chair. Both Greg and Mohamed are to be congratulated on putting together a first-rate conference program packed

with very interesting papers, with the overall theme of “Measurements of High Performance Devices and Applications”. The conference included four technical sessions and an interactive session. The technical sessions consisted of papers given as oral presentations. The technical sessions were titled “Emerging Technologies”, “High Performance Devices”, “Measurement and Calibration” and “High Power Measurements”. The interactive session featured papers presented during a separate poster session. All papers from both the technical sessions and the interactive session have since been published in the conference digest (copies of which can be ordered from www.arftg.org).

Also included in the conference was a Panel Session titled “High Power Measurements – Challenges and Future Trends”, chaired by Mohamed Sayed (Microwave & Millimeter Wave Solutions, Santa Rosa, California) and a Workshop titled “Future of High-Speed Electrical Waveform Metrology”, organized by Dylan Williams and Paul Hale (NIST, Boulder, Colorado).



66th ARFTG conference technical session

The 66th Conference attendees selected as the Best Technical Session Paper “Demonstration of Carbon Nanotube Field Effect Transistor Operation at 23 GHz” by Aaron Pesetski, James Baumgardner, James Murduck, Erica Folk, John Przbysz, John Adam and Hong Zhang (Northrop Grumman Corporation). The Best Poster Paper was “Design of a Single Chip Antenna Combined with Coplanar Matching Circuit and Duplexer” by Haruichi Kanaya, Kewnta Seki and Keiji Yoshida (Department of Electronics, Kyusu University, Japan). The Best Exhibit was voted to be SUSS MicroTec.

66th CONFERENCE EXHIBITS

The exhibits area gave conference attendees an excellent opportunity to see the latest range of products that are available from some of the leading suppliers in the RF and microwave industry. There is also the opportunity to interact with key staff representing these

organizations, to discuss specific measurement needs and to identify solutions to measurement problems.



66th Conference Exhibits

The following companies chose to exhibit their equipment at this conference: Agilent Technologies, Anritsu Corporation, BroadWave Technologies, Cascade Microtech, Electro Rent Corporation, Focus Microwaves, Micro-Coax, Modelithics, Rohde & Schwarz, SUSS MicroTec and Tektronix. To exhibit at future conferences, please contact the ARFTG Exhibits Chair at exhibits@arftg.org.

66th CONFERENCE AWARDS

ARFTG President, Brian Pugh, presided over the awards banquet, which took place on the evening of December 1st, 2005. The award for the Best Paper from the previous (65th) conference (held in Long Beach, California) was presented to Yves Rolain and Wendy Van Moer (VUB, Belgium) and Jeff Jargon and Don DeGroot (NIST, Boulder) for their paper, "On Peculiarities of S-parameter Measurements". The award for Best Poster Paper was presented to Peter Blockley (Macquarie University, Australia), Daniel Gunyan and Jonathan Scott (Agilent Technologies, Santa Rosa) for their paper "Wide-Bandwidth, Vector-Corrected Measurement with High Spurious-Free Dynamic Range". The award for the Best Exhibitor was presented to Rohde & Schwarz. Certificates of appreciation were presented to the organizers of the 66th conference, namely: Greg Burns, Conference Chair; and, Mohamed Sayed, Technical Program Chair.

Past President Charles Wilker was presented the ARFTG Distinguished Service Award for his outstanding leadership and service to the group.

ARFTG FELLOWSHIP

An ARFTG Fellowship was awarded to Maciej Myslinski, from K.U.Leuven, Belgium. Sponsored by Dr. Dominique Schreurs, his area of research is the use of multi-sine waveforms to characterize large-signal devices.

ANNUAL BUSINESS MEETING

The annual ARFTG Business Meeting was held during the 66th conference and was convened by ARFTG President, Brian Pugh. A significant part of this meeting consisted of electing five members to serve on the ARFTG Executive Committee (ExCom). Each candidate was given an opportunity to give a brief introduction prior to the voting. The election resulted in the re-election of Tom Ruttan, Ray Tucker, Uwe Arz, Ken Wong and Joe Tauritz to the ExCom.

RECENT EVENTS

NVNA USERS' FORUM - EUROPE

The NVNA Users' Forum – Europe took place during European Microwave Week 2005. This meeting was co-sponsored by the TARGET European Network of Excellence (www.target-net.org). 20 participants from industry and the academic world attended the Forum on Thursday evening, October 6th. The meeting included a discussion on a recent round robin measurement comparison exercise of an RF amplifier, measured by eight groups under the same measurement conditions.

This was followed by a presentation by Fabien De Groote from IRCOM, University of Limoges, on his PhD research entitled "Pulsed Time Domain Characterization of High Power GaN Transistors". Finally, presentations were given by Monica Barciela, Vigo University, on the LSNA research activities of her group, and Jean-Pierre Teyssier, IRCOM, on a newly developed pulsed control option board for LSNA embedded PC.

The Forum organizers were Dominique Schreurs, Wendy Van Moer and Kate Remley. A summary of the meeting is available at www.arftg.org.

FUTURE EVENTS

SPRING 2006 ARFTG Conference

The 67th ARFTG Microwave Measurement Conference will be held on June 16th, 2006, in San Francisco, California, as part of Microwave Week 2006, which also includes the IEEE/MTT-S International Microwave Symposium (www.ims2006.org) and the Radio Frequency Integrated Circuits symposium (www.rfic2006.org).

The theme for the ARFTG conference is “Design and Measurements of High Power Devices and Systems”. For more information, contact the Conference Chair, Ken Wong (ken_wong@agilent.com), Agilent Technologies, or the Technical Program Chair, Mohamed Sayed (mmsayed@sbcglobal.net). Alternatively, for up-to-date information on the conference (including dates for submissions of papers, exhibits information, etc), visit www.arftg.org.



The Renaissance Parc 55 Hotel, venue for the 67th ARFTG Microwave Measurement Conference

NVNA Users’ Forum – International

The ARFTG NVNA Users’ Forum will also hold a meeting during Microwave Week 2006. For more information, please contact the organizers: Dominique Schreurs (dominique.schreurs@esat.kuleuven.ac.be), Wendy Van Moer (wendy.vanmoer@vub.ac.be) or Kate Remley (remley@boulder.nist.gov).

Joint ARFTG/IMS Workshops

ARFTG has chosen to co-sponsor two workshops during Microwave Week 2006. These are: “High Speed Digital Signal Integrity”, being organized by Tom Ruttan (Intel Corporation) and Mike Resso (Agilent Technologies); and, “Practical Methods for Determining the Accuracy of Measurements – a Review of Techniques Both Old and New”, being organized by Dennis Lewis (Boeing), Bela Szendrenyi (Agilent Technologies) and Nick Ridler (NPL). For up-to-date information on these workshops, contact Dominique Schreurs (dominique.schreurs@esat.kuleuven.ac.be), the ARFTG Workshop Coordinator.

NVNA Users’ Forum - Europe

It is planned to hold a meeting of the ARFTG NVNA Users’ Forum during European Microwave Week 2006, which takes place from September 10th to 15th, in Manchester, UK. More information on European Microwave Week 2006 can be found at: www.eumw2006.com.

FALL 2006 ARFTG SYMPOSIUM

The Fall 2006 ARFTG Microwave Measurement Symposium will be held the last week of November 2006 in Broomfield, Colorado. The 68th Conference theme is “Measurement for Emerging Technologies”. As in previous years, it is planned to hold the ARFTG/NIST Microwave Measurement Short Course and a Nonlinear Measurement Workshop alongside this conference. There will also be a meeting of the ARFTG NVNA Users’ Forum. For more information, visit www.arftg.org; or contact the ARFTG Conference Chair, Ronald Ginley (rginley@boulder.nist.gov), NIST; or the ARFTG Technical Program Chair, Tom Ruttan (thomas.g.ruttan@intel.com), Intel.

CD-ROM PROCEEDINGS, DIGESTS AND COURSE NOTES

Available for purchase are printed digests and course notes from this and previous conferences. Also the collected ARFTG Digests for 1982-2001 conferences are also available on CD-ROM. Additional information can be found at www.arftg.org or by contacting Jim Taylor (jtaylor@blitz-it.net), the ARFTG Executive Secretary.

CHECK YOUR MEMBERSHIP STATUS

Please check the address label attached to this mailing. It indicates your membership status as either "Member in Good Standing", "Expiring", or "Non-member". To maintain your membership in good standing, you must attend at least one conference per year, or send \$25, for membership renewal, to:

ARFTG, PO Box 228, Rome, NY 13442-0228.

CORRECTIONS

Every effort has been made to publish correct information in this newsletter. Any significant errors should be reported to: Nick Ridler (nick.ridler@npl.co.uk), ARFTG Secretary, so that corrections can be reported in the next issue of the newsletter.