



## ***AUTOMATIC RF TECHNIQUES GROUP***

### **CONFERENCE NEWSLETTER**

**FALL 2004**

**NUMBER 32**

## **64<sup>th</sup> ARFTG Conference**

### ***Digital Communication System Metrics***

#### **OVERVIEW**



*The Wyndham Resort, Orlando, Florida – venue for the Fall 2004 ARFTG meetings*

The Fall 2004 ARFTG activities took place at the Wyndham Resort, Orlando, Florida, from November 30<sup>th</sup> to December 3<sup>rd</sup>, 2004. The ‘main event’ was the 64<sup>th</sup> ARFTG Microwave Measurements Conference, which took place on December 2<sup>nd</sup> and 3<sup>rd</sup>. However, this was preceded by two other important meetings: the NIST/ARFTG Microwave Measurements Short Course (held on November 30<sup>th</sup> and the morning of December 1<sup>st</sup>) and a Pulsed Measurement Workshop (on the afternoon of December 1<sup>st</sup>). Taken together, this amounted to nearly 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 both past and present, visit the ARFTG website at [www.arftg.org](http://www.arftg.org).

#### **SHORT COURSE**

The Fall 2004 ARFTG activities began with the 11<sup>th</sup> annual NIST/ARFTG Microwave Measurements 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 measurements community.

The course material covered basic measurement techniques on Day 1, including: VNA error models and calibration methods; on-wafer measurements; RF connectors and transmission lines; noise and power measurements. Additional in-depth topics were covered on Day 2, including: phase noise, uncertainty of measurement and large signal network analysis. This year, an additional topic was added to the agenda covering digital communication systems measurements. This provided an excellent introduction to the subject, and was especially relevant to those staying on for the ARFTG conference since this was the theme for this conference.

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

## **PULSED MEASUREMENT WORKSHOP**

The theme for the Fall 2004 ARFTG workshop was Pulsed Measurements. It was organized by Jonathan Scott, of Agilent Technologies, Santa Rosa, California, and was held on Wednesday afternoon, December 1<sup>st</sup>, immediately after the NIST/ARFTG Microwave Measurements Short Course. The workshop began with a presentation by Larry Dunleavy, Modelithics Inc, on "Applications of pulsed IV measurements in non-linear transistor modeling". Three presentations followed, given by: Peter Blockley, Macquarie University, Sydney, Australia, on "Pulsed IV"; Jonathan Scott, on "Pulsed I/V and pulsed S-parameters – some applications"; and, Jean-Pierre Teyssier, Université de Limoges, France, on "Large signal characterization of microwave transistors with pulsed I(V) and pulsed S-parameters". The workshop was a great success and will be followed by further workshops on nonlinear measurement related topics at future Fall ARFTG events. Thanks are due to all those involved in the workshop – especially Jonathan Scott who did an excellent job as workshop organizer. If you have suggestions for future workshop topics, please contact the ARFTG Workshop Coordinator, Dominique Schreurs ([dominique.schreurs@esat.kuleuven.ac.be](mailto:dominique.schreurs@esat.kuleuven.ac.be)).

## **CONFERENCE TECHNICAL SESSIONS**

The 64<sup>th</sup> ARFTG Microwave Measurements Conference was truly an international affair with significant numbers of attendees coming from Europe, the Asia-Pacific region and, of course, North America. The conference began with a brief introduction by Joe Tauritz, the Conference Chair. Joe then handed the proceedings over to Bill Eisenstadt, the Technical Program Chair. Both Joe and Bill are to be congratulated on putting together a conference program packed with very interesting papers, with the overall theme of "Digital Communication System Metrics". This theme further sub-divided into six Technical Sessions and an Open Forum. The Technical Sessions contained papers given as oral presentations. These technical sessions were titled "Uncertainty", "Digital Communications System Metrics", "Semiconductor Modelling", "Differential Measurements", "Microwave Measurement Techniques" and "On-wafer Techniques". The Open Forum session consisted of papers presented as posters during the breaks from the Technical Sessions. All papers presented in the Technical Sessions and the Open Forum have been published in the conference digest (copies of which can be ordered from [www.arftg.org](http://www.arftg.org)).

Voted as the Best Technical Session Paper by the conference attendees, was "A generalized approach to the propagation of uncertainty in complex S-parameter measurements" by Nick Ridler and Martin Salter, of NPL, UK. There was a tie for Best Open Forum Paper, between "A non-contacting sampled-line reflectometer for microwave scattering parameter measurements" by Dan Hui and Robert M Weikle II, University of Virginia, Charlottesville, VA, and "Design of on chip coplanar waveguide matching circuit for SiGe BiCMOS RF amplifier" by Haruichi Kanaya, Tetsuya Nakamura and Keiji Yoshida, Kyushu University, Fukuoka, Japan. The Best Exhibitor was voted to be the Anritsu Corporation.

## **CONFERENCE EXHIBITS**

The exhibits area gave conference attendees an excellent opportunity to see some of the latest equipment that's available from some of the leading manufacturers 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.



*Attendees were given ample opportunity to visit the conference exhibits area*

The following companies chose to exhibit their equipment at this conference: Agilent Technologies; Anritsu Corporation; Cascade Microtech; W L Gore & Associates; Maury Microwave Corporation; Rohde & Schwarz; and, Tektronix. To exhibit at future conferences, please contact the ARFTG Exhibits Chair at [exhibits@arftg.org](mailto:exhibits@arftg.org).

## **CONFERENCE STUDENT FORUM**

This conference also introduced a new type of technical session alongside the other regular conference activities. Namely, a Student Forum, which took place on the afternoon of the second day of the conference. This forum gave graduate students from universities local to

the conference location an opportunity to present their recent microwave-related research in a poster-style presentation format. A total of 14 students from the Universities of Florida and South Florida chose to exhibit their work, which was greeted enthusiastically by the ARFTG conference attendees. It is hoped that a selection of this work may be made available soon on the ARFTG web-site.



*Attendees examining the papers presented during the Student Forum session*

## CONFERENCE AWARDS

ARFTG President, Brian Pugh, presided over the awards banquet, which took place on the evening of December 2<sup>nd</sup>, 2004. The award for the Best Paper from the previous (63<sup>rd</sup>) conference (held in Fort Worth, Texas) was presented to Ken Wong, of Agilent Technologies, for his paper, "The 'Unknown Thru' Calibration Advantage". The award for Best Poster Paper was presented to Magnus Isaksson (University of Gävle, Sweden) and David Wisell (University of Gävle and Ericsson AB, Gävle, Sweden) for the paper "Extension of the Hammerstein Model for Power Amplifier Applications". The award for the Best Exhibitor was presented to Tektronix, Inc.

Certificates of appreciation were also presented to the organizers of this (64<sup>th</sup>) conference, namely: Conference Chair, Joe Tauritz; Technical Program Chair, Bill Eisenstadt; and, Local Host, Raymond Tucker.

## ANNUAL BUSINESS MEETING

The annual ARFTG Business Meeting was held during the 64<sup>th</sup> 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). Biographies for the candidates had been distributed prior to the voting. The election resulted in the re-election of J Gregory Burns, Leonard Hayden and Brian Pugh to

the ExCom, and, William Eisenstadt and Mohamed Sayed as newly elected members.

It should also be noted that the end of the 64<sup>th</sup> conference marked the completion of the terms of office of two members of ExCom – Dylan Williams and John Cable – who choose not to stand for re-election. Both Dylan and John are to be thanked for their valuable contributions to the ARFTG ExCom during these terms of office.

## OTHER RECENT EVENTS: THE NVNA USERS' FORUM

The ARFTG NVNA (Nonlinear Vector Network Analyzer) Users' Forum was organized for the first time in Europe (Amsterdam, RAI Convention Center) in conjunction with European Microwave Week 2004. This forum was co-sponsored by ARFTG and the European TARGET Network of Excellence ([www.target-net.org](http://www.target-net.org)), and, was a great success! More than 40 participants from industry and the academic world signed in for the Forum on Tuesday evening, October 12<sup>th</sup>. The meeting started with two interactive discussions on the definition of weakly nonlinear systems and the power of multisines. Next, Johan Paduart (Vrije Universiteit Brussel, Belgium) and Giovanni Loglio (University of Firenze, Italy) presented their PhD research and asked the audience for their opinion on some problems. This was followed by presentations given by three groups describing progress made with their latest research activities. The Forum organizers were Dominique Schreurs, Wendy Van Moer and Kate Remley. A summary of the meeting is available at [www.arftg.org](http://www.arftg.org).

## FUTURE EVENTS

### Spring 2005 ARFTG activities

#### *Microwave Measurements Conference*

The 65<sup>th</sup> ARFTG Microwave Measurements Conference will be held on June 17<sup>th</sup>, 2005, in Long Beach, California, as part of Microwave Week 2005, which also includes the International Microwave Symposium ([www.ims2005.org](http://www.ims2005.org)) and the Radio Frequency Integrated Circuits Symposium ([www.rfic2005.org](http://www.rfic2005.org)).

The theme for the ARFTG conference is "Measurements for Millimeter-Wave Applications". For more information, contact the conference chair Thomas Ruttan ([thomas.g.ruttan@intel.com](mailto:thomas.g.ruttan@intel.com)), Intel Corporation, or the Technical Program Chair, Nick Ridler ([nick.ridler@npl.co.uk](mailto:nick.ridler@npl.co.uk)), NPL, UK. Alternatively, for up-to-date information on the conference (including dates for submissions of papers, exhibits information, etc), visit [www.arftg.org](http://www.arftg.org).





*The Renaissance Long Beach Hotel – venue for the 65<sup>th</sup> ARFTG Microwave Measurements Conference*

### **NVNA Users' Forum**

The ARFTG NVNA (Nonlinear Vector Network Analyzer) Users' Forum will also hold a meeting during Microwave Week 2005. For more information please contact the Forum organizers; Dominique Schreurs ([dominique.schreurs@esat.kuleuven.ac.be](mailto:dominique.schreurs@esat.kuleuven.ac.be)), Wendy Van Moer ([wendy.vanmoer@vub.ac.be](mailto:wendy.vanmoer@vub.ac.be)) or Kate Remley ([remley@boulder.nist.gov](mailto:remley@boulder.nist.gov)).

### **Joint ARFTG/IMS Workshops**

ARFTG has chosen to co-sponsor two workshops during Microwave Week 2005. These are: "On-wafer microwave measurements - state of the art and future directions", being organized by Uwe Arz (PTB), Dylan Williams (NIST) and Richard Dudley (NPL); and, "High frequency digital backplane interconnect characterization and design", being organized by Ken Wong (Agilent Technologies) and Thomas Ruttan (Intel Corporation). Both workshops are currently being formulated and will then be evaluated by the IMS workshop coordinators. For the latest information on the status of these workshops, please contact the ARFTG Workshop Coordinator, Dominique Schreurs ([dominique.schreurs@esat.kuleuven.ac.be](mailto:dominique.schreurs@esat.kuleuven.ac.be)).

### **NVNA Users' Forum**

It is planned to hold a meeting of the ARFTG NVNA Users' Forum during European Microwave Week 2005, which takes place from October 3<sup>rd</sup> to 7<sup>th</sup>, 2005, in Paris, France. (For more information on European Microwave Week 2005, visit [www.eumw2005.com](http://www.eumw2005.com).)

### **Fall 2005 ARFTG activities**

The 66<sup>th</sup> ARFTG conference will be held in December 2005 in Washington, DC. The conference theme is yet to be announced. As in previous years, it is planned to hold the NIST/ARFTG Microwave Measurements Short Course and a Workshop alongside this conference. The ARFTG NVNA Users' Forum will also hold a meeting alongside these events. For more information, visit [www.arftg.org](http://www.arftg.org) or contact the Conference Chair, Greg Burns ([john.g.burns@ngc.com](mailto:john.g.burns@ngc.com)), of Northrop Grumman, or Mohamed Sayed ([mmsayed@sbcglobal.net](mailto:mmsayed@sbcglobal.net)), the Technical Program Chair.

### **MEASUREMENT COMPARISON PROGRAM**

ARFTG continues to operate its highly successful Measurement Comparison Program. This consists of comparing measurements made on 'enhanced' VNA verification kits containing devices with the following connector types: 7-16, Type-N, 7 mm, 3.5 mm, 2.92 mm (K), 2.4 mm and 1.85 mm (V). More information, including how to participate in this program, can be found at [www.arftg.org](http://www.arftg.org).

### **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 for sale on CD-ROM. Additional information can be found at [www.arftg.org](http://www.arftg.org) or by contacting Jim Taylor ([jtaylor@blitz-it.net](mailto: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](mailto:nick.ridler@npl.co.uk)), ARFTG Secretary, so that corrections can be reported in the next issue of the newsletter.