

# THE BEEET



## Bulletin of the IEEE Tucson Section

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Tucson Section Meeting Sponsored by the Tucson Joint Chapter of MTT, AP, EMC, and COM:

### Advanced Antenna Systems for 21<sup>st</sup> Century Satellite Communications

**Speaker: Dr. Sudhakar Rao**

Technical Fellow

Northrop Grumman Aerospace Systems

LOCATION: University of Arizona, Room ECE 530

DATE: Thurs, Feb 11, 2015, 6:00 pm

Refreshments Provided

#### ABSTRACT

The 21st century has so far seen several new satellite services such as local-channel broadcast for direct broadcast satellite service (DBS), high capacity K/Ka-band personal communication satellite (PCS) service, hosted payloads, mobile satellite services using very large deployable reflectors, high power hybrid satellites etc. All these satellite services are driven by the operators need to reduce the cost of satellite and pack more capability into the satellite. Antenna sub-system design, mechanical packaging on the spacecraft, and RF performance become very critical for these satellites. This talk will cover recent developments in the areas of antenna systems for FSS, BSS, PCS, & MSS satellite communications. System requirements that drive the antenna designs will be presented initially with brief introduction to satellite communications. Reflector and array antenna designs will be covered in this talk.

Advanced antenna system designs for contoured beams, multiple beams, and reconfigurable beams will be presented. Contoured beam antennas using dual-gridded reflectors, shaped single reflectors, and shaped Gregorian reflectors will be discussed. Multiple beam antenna (MBA) concepts and their advantages compared to conventional contoured beams will be introduced. Various designs of the MBA for DBS, PCS, and MSS services will be discussed along with practical examples. Recent advances in feed technology and reflector technology will be addressed and few examples. Advances in multi-band antennas covering multiple bands will be presented. Topics such as antenna designs for high capacity satellites, large deployable mesh reflector designs, low PIM designs, and power handling issues will be included. Advanced high

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power test methods for the satellite payloads will be addressed. Brief introductions to TT&C antennas, passive inter modulation products (PIM) and multipaction for satellite payloads will be given. Future trends in the satellite antennas will be discussed. At the end of this talk, engineers will be exposed to typical requirements, designs, hardware, software, and test methods for various satellite antennas.

#### BIOGRAPHY

Dr. Rao became an IEEE Fellow in 2006 and a Fellow of IETE in 2009. He received several awards and recognitions that include 2002 Boeing's Special Invention Award for series of patents on satellite antenna payloads, 2003 Boeings' technical achievement award, Lockheed Martin's Inventor of Technology award in 2005 & 2007, IEEE Benjamin Franklin Key Award in 2006, Delaware Valley Engineer of the Year in 2008, and Asian American Engineer of the year award in 2008. He received IEEE Judith Resnik Technical Field Award in 2009 for pioneering work in aerospace engineering. He is the recipient of the IETE's 2015 Prof. S.N. Mitra Memorial award. He received best reviewer recognition by the IEEE Transactions on Antennas & Propagation Journal for the years 2014 and 2015. Dr. Rao is appointed as the Distinguished Lecturer by the IEEE APS for a three year period (2014-2016). He was the Chair for the IEEE APS "Industry Initiatives Committee" during 2010-2015, Associate Editor for the IEEE Antennas & Propagation Magazine's "Antenna Applications Corner", Associate Editor for the IEEE Transactions on Antennas & Propagation, Special Session Organizer/Chair for the last six IEEE APS/URSI Symposia, Technical Program Committee member for IEEE APS/URSI Symposia from last 10 years, and reviewer for the IEEE AP Transactions, WPL, IEE etc.

## Help your section, help your career, help yourself!

The Tucson section has several open volunteer opportunities for the right volunteer. There are lots of benefits to volunteering:

- You get to help decide on the activities and programs that will make a difference in our community over the next year
- You get to work with other smart, dedicated engineers
- You get to learn new skills
- You get to show off your skills to others who are working right here in Tucson

So what jobs are open?

**Recording Secretary** is responsible for documenting the activities of our administrative council. This typically includes keeping minutes of committee

meetings, submitting reports as required, and participating in any votes that come up.

**Membership Development Chair** uses the IEEE membership database to keep track of the current members in our section, identify members eligible for advancement, monitor trends, and obtain and distribute recruiting materials as needed.

**PACE Chair (Professional Activities Committee for Engineers)** helps arrange professional development activities, usually supported by the larger IEEE PACE foundation. This could include career-related seminars, job fairs, project management training, and more.

Want to help in some other way? Just ask - we welcome your assistance in any capacity!

## Become an IEEE Senior Member!

Do you want to become a senior member of the IEEE? The IEEE wants to promote qualified candidates to senior membership! If you have 10 years of professional experience of which five years of significant professional performance, you are qualified for a senior member upgrade. Educational experience such as a bachelor's degree in an IEEE-designated field counts 4 years to that number, a master's degree counts 5 years and a doctorate counts 6 years. In order to find out more, point your web browser to [www.ieee.org](http://www.ieee.org) and search for senior membership!

### *Senior Membership:*

<http://www.ieee.org/web/membership/senior-members/>

Applications can be found online. You will need the references of three current senior members or fellows. If you need assistance, contact Joseph Wu at [joewu@ieee.org](mailto:joewu@ieee.org).

## Save the date....

The next meeting will come sometime in the new year!

We currently don't have another meeting planned right now. But we'll be active again soon.

Look for another meeting in March or April. Check the IEEE website for updates!

## U of A Student Branches

In the Tucson Section, there are active student branches. The Student Branch Chapter of the MTT frequently brings in speakers from the distinguished lecturer series.

The U of A main student branch is also active. They have been running an open lab space in the ECE department. They have been running their own meetings and occasionally have game nights.

If you're interested in finding out what they do, or want to help out with a donation go to:

<http://uaieee.com>

<http://www2.engr.arizona.edu/~mtt/>

## Keep Up with the Tucson Section: Join our email list!

The Tucson Section email list delivers the latest IEEE Tucson news right to your email box. To join, simply send an email to

*[listserv@listserv.ieee.org](mailto:listserv@listserv.ieee.org)*

Put the following in the body of the message:

*[subscribe TUCSON-SECTION-ALL yourfirstname yourlastname](#)*

You'll receive an email with instructions for confirming your new subscription.

## Other News

### Upcoming Conferences

2016 Wearable Robotics Association Conference (wearRAcon)

10 Feb - 12 Feb 2016

Arizona Grand Resort

Phoenix, AZ, USA

<http://wearablerobotics.com/wearraconfront/>

2016 IEEE International Conference on Image Processing (ICIP)

25 Sep - 28 Sep 2016

Phoenix Convention Center

Phoenix, AZ, USA

<http://2016.ieeeicip.org/>

2016 14th International Symposium on Modeling and Optimization in Mobile, Ad Hoc, and Wireless Networks (WiOpt)

09 May - 13 May 2016

Arizona State University

Tempe, AZ, USA

<http://www.wi-opt.org/>

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[member-services@ieee.org](mailto:member-services@ieee.org)

General IEEE Information

1-800-678-IEEE(4333)

## We need to hear from you!

How can we make IEEE a better organization? We can only do it with your help. As a volunteer organization, IEEE depends on your participation to accomplish all of our goals.

As you can see from this newsletter, there are lots of activities where you can actively contribute. Are you good at organization? Volunteer to head one of our Chapters or to help organize our general meetings. Want to show off or improve your internet skills? Volunteer to help with our Web site. Interested in promoting our field to the next generation of engineers? Help with Engineers Week, or as a judge for any of our student competitions.

Even if you only have a little bit of time, there's sure to be an IEEE opportunity that will interest you. Even if you have no free time at all, but have ideas for meetings or activities that promote engineering and the IEEE, let us know! We'd like to hear from you. Please contact Joseph Wu at [joewu@ieee.org](mailto:joewu@ieee.org).

*We're on the Web!*

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