"Advanced Antenna Systems for 21st Century Satellite Communication Payloads"

IEEE MTT/AP Orlando Chapter & Raj Mittra Distinguished Lecture Program

DATE/TIME: Thursday, November 3rd, 2016 (5:00 PM-6:00 PM)

SPEAKER: Dr. Sudhakar Rao
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ABSTRACT:

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. 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. 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 along with a 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 power test methods for the satellite payloads will be addressed. Future trends in the satellite communications including use of higher frequency bands 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.

ABOUT THE AUTHOR

Sudhakar K. Rao received B.Tech, M.Tech, and Ph.D degrees in electronics & communications engineering from REC Warangal, IIT Kharagpur, and IIT Madras in 1974, 1976, and 1979 respectively. He worked on phased array antennas for airborne applications during 1980-1981. He worked as a post-doctoral fellow at University of Trondheim, Norway and then as a research associate at University of Manitoba during 1981-1983. During1983-1996, he worked at Spar Aerospace Limited (now MDA), Montreal, Canada, as a Staff Scientist and developed advanced antennas for several satellite communications. From 1996-2003 he worked as Chief Scientist/Technical Fellow at Hughes/Boeing Satellite Systems and developed multiple beam antennas and reconfigurable beam payloads for commercial and military applications. During the period 2003-2010, he worked as a Corporate Senior Fellow at Lockheed Martin Space Systems and developed antenna payloads for fixed satellite, broadcast satellite, and personal communication satellite services. He invented novel high power TVAC test methods for satellite payloads using "pick-up horn absorber loads" that have about 8 times cost and schedule savings which has been successfully used on more than 10 satellite payloads. He is currently a Technical Fellow at Northrop Grumman Aerospace Systems, Redondo Beach, CA working on advanced antenna systems for space & aircraft applications.

LOCATION: **University of Central Florida**
HEC 113

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