

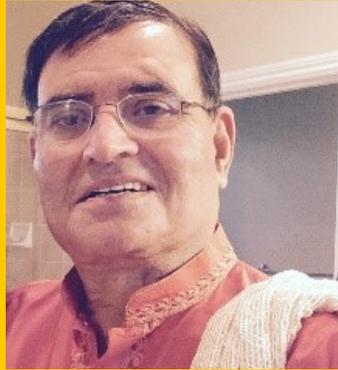


Electrical and Computer Engineering

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

“Damped Sinusoidal Signals Energizing Pulsed Helical Antennas”

Thursday, Feb 13th, 2020 (4:00 PM–5:00 PM) - HEC 113



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Abstract

CW sources of sinusoidal signals and transmitting systems are the mainstay in many areas of civilized life such as communication, radar, radio and microwave cooking. Recently damped sinusoidal sources are finding their place in vulnerability studies of electronic systems. While a CW source is of single frequency, a damped sinusoidal source has a moderate bandwidth. We describe several such moderate band systems (sources and antennas) starting with a system called MATRIX which was integrated into a half-paraboloidal reflector antenna. Based on the switched oscillator design in MATRIX, we outline the problem of designing, fabricating switched oscillators at four different frequencies of 200 MHz, 300 MHz, 400 MHz and 500 MHz. Such sources can also be integrated into helical antennas. Helical antennas are very versatile antennas capable of producing many different types of radiation characteristics. They were invented by Prof. John D. Kraus of Ohio State University in 1946 and he has an interesting anecdote in his book about how and why he thought of it. Its performance is bounded by a magnetic dipole or a loop when length goes to zero, and an electric dipole when the major diameter goes to zero. Within these bounds, the helical antenna radiates a circularly polarized electromagnetic wave with varying characteristics. A 500 MHz damped sinusoidal oscillator has been integrated into a modified commercial helical antenna with a bandwidth of 400 MHz to 600 MHz. Such damped sinusoidal sources and antennas have found their application in susceptibility studies of electronic systems.

Biography

Dr. Giri has 45 years of work experience in the general field of electromagnetic theory and its applications in NEMP (Nuclear Electromagnetic Pulse), HPM (High-Power Microwaves), Lightning, and UWB (Ultra-Wideband). A complete description of his academic training and work experience may be seen at his website: www.dvgiri.com He obtained the B.Sc., Mysore University, India, (1964), B.E., M.E., Indian Institute of Science, (1967) (1969), M.S., Ph.D., Harvard University, (1973) (1975), Certificate, Harvard Introduction to Business Program, (1981). Since 1984, he is a self-employed consultant doing business as Pro-Tech, in Alamo, CA, performing R&D work for U.S. Government and Industry. He is also an Adjunct Professor in the Dept. of ECE, University of New Mexico, Albuquerque, NM. Dr. Giri has taught graduate and undergraduate courses in the Dept. of EECS, University of California, Berkeley campus. Dr. Giri was a Research Associate for the National Research Council at the Air Force Research Laboratory (AFRL), Kirtland AFB, New Mexico, where he conducted research in EMP and other aspects of electromagnetic theory..