Contribution ID: **245** Type: **Oral Presentation**

SWaP ANALYSIS AND DESIGN OF A HIGH POWER HELICAL ANTENNA ARRAY WITH DISCRETE DIELECTRIC LOADING*

Tuesday 5 June 2018 17:00 (15 minutes)

Helical designs have previously been selected for high power pulsed antennas due to their ability to radiate a high power circularly polarized signal over a relatively wide bandwidth. However, conventional techniques to increase the gain, including both increasing the number of turns of the helix and forming arrays of helical elements, greatly increase the size and weight of the antenna. While several techniques have been developed to reduce the size of helical elements, significantly decreasing the distance between turns of the helix is constrained by the resulting loss of circular polarization and significant reduction of the bandwidth. NanoElectromagnetics LLC has developed techniques to load helical antenna elements with high dielectric constant, high dielectric strength composites to enable significant reduction of the helix turn spacing and overall length while maintaining circular polarization, wide bandwidth, and high power capabilities. With the shorter helical elements, the element spacing in a four-element array has also been reduced while minimizing side lobes. The U.S. Army Armament Research, Development and Engineering Center (ARDEC) and NanoElectromagnetics LLC have leveraged these techniques to design, develop, and validate a high power helical antenna array with significant Size, Weight, and Power (SWaP) improvements over conventional helical antenna arrays, resulting in approximately an order of magnitude reduction in the volume and weight of a four-element array. This work will outline the limitations on conventional helical antenna designs and present modeling and experimental results of a high power pulsed antenna array.

*Work supported by US Army Research, Development and Engineering Center (ARDEC) Directed Energy and Non-Lethal Branch

Authors: O'CONNOR, Kevin (NanoElectromagnetics LLC); Mrs CLARK, Kendra (NanoElectromagnetics, LLC); Dr CURRY, Randy (NanoElectromagnetics, LLC)

Presenter: O'CONNOR, Kevin (NanoElectromagnetics LLC)

Session Classification: Oral 8 - HPM, Analytical & Simulations

Track Classification: Repetitive Pulsed Power Systems, Repetitive Pulsed Magnetics, Accelerators, Beams, High Power Microwaves, and High Power Pulsed Antennas