

Nonlinear Effects in Active Phased Array System Performance

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Abstract

Simulation of any modern, active-phased array systems will be impacted by the finite-sized array edge effects leading to uneven nonlinear operations for T/R module devices affecting the circuit-level implementation of quantized phase shifters on beam performance.

By including the antenna array, feed network and active power amplifiers that drive the elements, this webinar will examine how co-simulation using nonlinear RF circuit simulation using Harmonic Balance along with 3-D electromagnetics can predict antenna radiation performance. Each element in the array is excited at a different power level to produce pencil- and shaped-beams, resulting in uneven gain compression among the power amplifiers. The analysis results illustrate this behavior and pattern degradation versus input overdrive is demonstrated. Finally, the presenters will demonstrate real-world, circuit-level effects of the finite quantization of the phase shifter, as well as installed performance on an aircraft.