NOVEL CHOKE RINGS FOR ULTRA-WIDEBAND ANTENNA ARRAY

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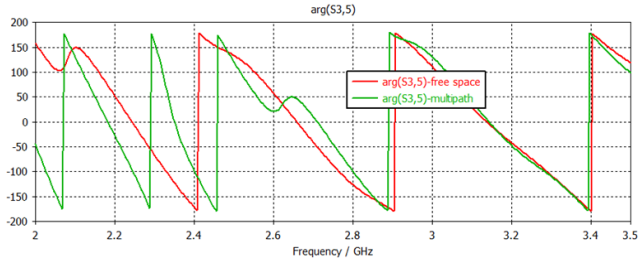
Multipath signals create non-regardless error in phase and amplitude measurement in RF receivers. Receivers with phase interferometry technique for direction finding needs measuring phase differences with high accuracy. Multipath signals are critical problem for this type of RF receivers especially at high frequencies. Conventional choke ring antennas are used for GNSS applications which has limited bandwidth. To mitigate reflection and refraction effect in ultra-wideband phase receivers which used array antennas, conventional conductive concentric cylinders cannot be efficient.



In this work, a suitable geometry is designed to suppress multipath signals in ultra-wideband receivers. For both circular and planar arrays, choke rings are designed and simulated in CST simulator. To improve reflected wave cancelation and prevent excitation of undesired modes, groove deep of choke rings should designed around one-quarter of wavelength. In that way for ultra-wideband receivers, concentric pyramids are chosen. Number of pyramids and their base shapes are designed based on antenna array geometry. Base and far dimensions, rang and offset of choke rings are optimized based on array element's pattern and locations. A critical point of these type of structures is related to designing proper choke rings for wide aperture array with proper stability and weight for fabrication. In this work, efficient pyramid ring's surfaces, slopes and heights of grooves for minimal number of rings (3 rings) for 80cm×100cm planar array between 2-6 GHz with five spiral elements is proposed. Based on simulated results, by optimizing ratio of ring's groove's deep and surface relative to each other, multipath signals trapped properly by choke rings and phase error will be decreases properly.