

Ultrawideband Cylindrical Array

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Cylindrical antenna arrays are being used in radar and communications applications that require 360° coverage, invariant diagrams, high gain, with low levels of cross-polarization and high directivity. In this communication, designs of multi-beam antennas with full coverage and circular polarization, are presented for UWB communications applications, for WiFi and 5G applications in indoor environments.

Antenna arrays with ultrawideband characteristics in the frequency range from 2 to 6 GHz have been designed, in linear and cylindrical configurations. The designs of the antennas are UWB monopoles. The design criteria have been adaptation, better than -10 dB, and isolation between adjacent cells better than -15 dB. The results have been optimized for isolated cells and for cells in periodic structures.

Unit cells have large bandwidth and linear polarization. They have also been designed with a unidirectional radiation pattern. The typical design approach focuses on achieving isolation between adjacent cells; however, in this case, the design intentionally prioritizes elements that are highly coupled to the radiators, which are differentially fed and produce an orthogonal polarization to the element, achieving a circular polarization in the array, with a unidirectional radiation pattern and a low profile.

Linear arrays of 5x2 elements and cylindrical arrays of 6x2 elements have been designed, obtaining directivity values greater than 10 dB across the entire band of interest. Noteworthy features include isolation between adjacent antennas greater than 18 dB in a bandwidth of 4 GHz, and a relative bandwidth with a 1:3 ratio between the minimum and maximum frequencies.

The design is scalable, being able to cover the entire frequency range between 2 and 6 GHz, including 5G and WiFi bands. The simulations and measurements of the prototype will be shown in the presentation.

The proposal stands out for its high degree of innovation, combining broadband antenna concepts with highly coupled periodic structures

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