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Spiral antenna with reconfigurable HIS using liquid crystals for monopulse radar application (Conference Paper)

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Abstract

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In this paper, the design of an electronically reconfigurable ground plane composed of a high impedance surface (HIS) based on liquid crystals is presented and used as a backing structure for a two-arm Archimedean spiral antenna. The structure is used to provide electronic switching of two different shaped radiation patterns for monopulse radar application; 1) sum-pattern (Σ -pattern), and 2) difference-pattern (Δ -pattern). The antenna arrangement is shown to exhibit either the Σ -or the Δ -beam by changing the permittivity (and hence reflection phase) of the HIS reflector when a bias voltage is applied between the periodic array and ground plane. The HIS is demonstrated to resonate at 6 GHz, and numerical results are employed to investigate the performance of the HIS-backed spiral arrangement, i.e. radiation pattern, impedance match, realized gain (Σ -pattern), and null depth (Δ -pattern). © 2017 IEEE.

Author keywords

[direction-finding application](#) [high impedance surface \(HIS\)](#) [liquid crystals](#) [monopulse radar](#) [spiral antenna](#)

Indexed keywords

Engineering controlled terms:

[Antenna arrays](#) [Antenna grounds](#) [Crystal structure](#) [Directional patterns \(antenna\)](#)
[Impedance matching \(electric\)](#) [Liquid crystals](#) [Microwave antennas](#) [Monopulse radar](#)
[Radar antennas](#) [Slot antennas](#)

Compendex keywords

[Archimedean spiral antennas](#) [Difference patterns](#) [Direction finding](#) [Electronic switching](#)
[High-impedance surfaces](#) [Numerical results](#) [Radar applications](#) [Spiral arrangement](#)

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[Spiral antennas](#)

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