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Entitled

A MAGNETO-THERMALLY CONTROLLABLE MICROSTRIP-PATCH ANTENNA FOR LOW RCS APPLICATIONS

by

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Abstract

This research focuses on the development of a novel technique for reducing the radar cross section (RCS) of a microstrip antenna operating in the terahertz spectral regime. This can be accomplished by loading the antenna with Indium Antimonide (InSb); a thermally-magnetically controllable semi-conductor. The low-RCS feature of the antenna implies that it becomes hardly detectable by detecting radars; a desired feature in stealthy applications. For an optimal operation beside low RCS, the other antenna parameters (e.g., radiated power, gain, standing-wave ratio, and reflection coefficient) must be within tolerable ranges. Thus, a study on the effects of the temperature and the static magnetic field of the InSb on all antenna parameters has been conducted using the High-Frequency Structural Simulator (HFSS) software.

A simple microstrip patch antenna loaded by InSb and fed by a coaxial cable has been simulated in HFSS. Plots of the various antenna parameters in relation to the temperature and the static magnetic field were obtained at some discrete frequency points; thereby revealing their effects on radiation characteristics. Furthermore, at each frequency point, the optimum values of the temperature and the static magnetic field were determined.

Our proposed design provides means of controlling and modifying RCS in the terahertz regime; which may be varied depending on the specific application requirements, (i.e., military, medical, etc.).

Keywords: Terahertz, Antenna, Scattering, RCS.