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Smart Cavity Design using FSS for Feedline Suppression

IP Status: Issued US Patent; **Application #:** 16/269,957

Configurable dual mode antenna system

A method for suppressing feedline interference in array applications uses a frequency selective surface (FSS). A Fabry-Perot Cavity (FPC) antenna with an integrated fluidic channel alters the FSS structure of the antenna and minimizes radiation from feedlines in antenna arrays and three dimensional (3D) packaging designs. The technology results either in beam-splitting or beam-focusing (with respect to near- and far-field performance of the antenna system), and the fluidic channel may be filled with air or deionized (DI) water. When the channel is filled with deionized water, the antenna system operates in beam-splitting mode, and when the channel is filled with air, it operates in beam-focusing mode. The configurable antenna system can switch from one mode to the other.

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Solves feedline interference and coupling

Demand for ubiquitous access to multiple radio terminals in wireless communication has been growing. As a result, reconfigurable radio platforms are being developed and advanced to address this need. Fabry-Perot Cavity (FPC) antenna systems offer the ability to beam form a source signal, but the energy focusing of weak feedline radiation through the FSS can lead to FPC system radiation pattern degradation. This feedline interference and coupling can degrade array and 3D high density packaging performance. This new method, by simply locally augmenting a frequency selective surface (FSS), reduces the feedline's impact on the overall antenna performance in general and solves feedline interference and coupling in array and 3D high density packaging.

Phase of Development

Technology ID
20160227

Category
Engineering & Physical Sciences/Photonics
Engineering & Physical Sciences/Semiconductor
Software & IT/Communications & Networking

Learn more

- Proof of concept. Simulations conducted for full-wave simulation of high-frequency electromagnetic fields.

Benefits

- Suppresses feedline interference in array applications
- Minimizes radiation from feedlines in antenna arrays and 3D packaging

Features

- Fabry-Perot Cavity (FPC) antenna with an integrated fluidic channel
- Locally augmented frequency selective surface (FSS)
- Beam-splitting or beam-focusing modes
- Fluidic channel filled with air or deionized (DI) water
- Configurable system switches from one mode to the other

Applications

- Mitigating feedline interference in arrays
- Minimizing radiation from feedline in an antenna arrays and 3D packaging designs
- Wireless communication
- Reconfigurable radio platforms

Researchers

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Publications

Comparative analysis of frequency selective surface geometry effect in Fabry-Perot Cavity antenna design
2015 IEEE 16th Annual Wireless and Microwave Technology Conference, WAMICON 2015, 11 June 2015
Fluidic switching and tuning of Fabry-Perot antenna
2015 IEEE Antennas and Propagation Society International Symposium, APS 2015 - Proceedings, 26 October 2015

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