



University of Central Florida

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Larger Bandwidth, Higher Performance Patch Antennas

Compact Integrated Filter and Microstrip Antenna

Patch antennas are ideal for communication and radar systems, because of their ease of fabrication and low profile. However, when high efficiency bandpass filters are added to reject out-of-band noise and interference, they typically require coaxial connections adding bulk or detuning the filter response of the low profile antenna, thus degrading the performance. Due to the high Q (quality) of the currently available patch antennas, any performance loss or signal degradation in their narrowband operation window is highly undesirable as bandwidth enhancement comes at the expense of efficiency.

UCF researchers have addressed these issues by integrating a microstrip patch antenna with a Co-Planar Waveguide (CPW) resonator filter that improves both bandwidth and efficiency of the antenna system, while eliminating the need for bulky external connections prone to induce noise and loss. The filter and antenna are co-designed as a single unit where the antenna works as both a resonator and a port of the filter, providing wider bandwidths, precision optimized antenna/filter performance, and lower cost to manufacture.

Technical Details

This patch antenna is integrated with a cavity resonator. The antenna acts as both part of the cavity filter and as a radiating element for the cavity filter / antenna system. The design of the antenna was rigorously synthesized to ensure that the integrated filter/antenna has all the analogues of an equivalent three-pole filter in terms of resonators, internal couplings, and external couplings. Due to the high Q factor (~ 700) of the cavity resonator and near loss-less transition between the antenna and filter, the overall efficiency of the filter/antenna system approaches 91%. This new filter/antenna architecture enables compact and low-loss RF front ends and phased array systems.

UCF Inventors

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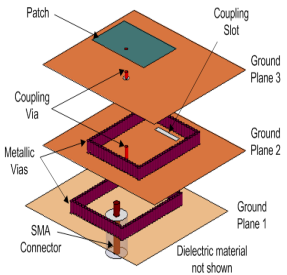


Fig: Exploded view of a vertically integrated three-pole filter / antenna with two cavity resonators and one patch antenna.

Benefits

- Reduces the system size
- Improves the system efficiency
- Enhances the antenna bandwidth

Applications

- Communication systems
- Radar
- Sensor systems
- Wireless devices
- GPS
- Phased array antenna systems

Tech Fields

Communications, Defense

Keywords

patch antenna, radar, communication

If you or your company are interested in this opportunity, Contact:

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