Skysong Innovations
Advancing the Arizona State University Knowledge Enterprise

1475 N. Scottsdale Road, Suite 200
Scottsdale, AZ 85287-3538
Phone: 480 884 1996 Fax: 480 884 1984

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Inventors

Rodolfo Rudy Diaz

Tara Yousefi

Contact

Shen Yan
shen.yan@skysonginnovations.com

Optimal Permeable Antenna Flux Channels for Conformal Applications

Conventional metal-and-dielectric antennas apply metallic conductors to transmit high frequency signals for effective communication between devices. However, these antennas cannot be placed conformal to a conducting surface without suffering disadvantages from the disruption of current.

Solving this problem requires the construction of a different type of antenna called a permeable antenna. This antenna is able to be attached conformal to conducting surfaces, but its use results in a loss of important electromagnetic waves. This limits the antenna's efficiency. Therefore, it is necessary to improve permeable antennas to enable effective communication while set up conformal to conducting surfaces without limiting the efficiency of the antenna.

Researchers at Arizona State University developed a permeable antenna that maximizes efficiency and bandwidth beyond current implementations. This device achieves high efficiency because it conforms to various conducting surfaces in factors as shallow as one-hundredth of a wavelength.

In principle, this alternate approach focuses on depending on the occupied area of the bandwidth rather than the conformal thickness. The innovative design guides transmitted waves close to the speed of light over a wide band of frequencies and behaves more like an ideal electromagnetic dual of metal antennas.

Potential Applications

- Military and security communication
- Varied bandwidth and frequency transmissions
- Metal antennas on conformal surfaces

Benefits and Advantages

- Innovative Design – This application of the permeable antenna reduces signal interference and is not size limited for a heightened communication rate

- High Efficiency – Changes to the antenna port makes this technology more efficient that conventional permeable antennas