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Nonreciprocal And Reconfigurable Phased-Array Antennas

Tech ID: 30610 / UC Case 2019-452-0

ABSTRACT

Researchers at the University of California, Davis have developed nonreciprocal and reconfigurable phased-array antennas with demonstrated advantages over competing, current technologies.

FULL DESCRIPTION

A phased-array antenna is a device that generates radiation patterns whose shape and direction can be electronically controlled. These antennas are associated with everyday technologies that include radio and optical frequencies, and find wide applications in military radar systems and tracking platforms, automotive radar, and satellite, wireless, and optical communications. To date, these devices are reciprocal and thus provide identical response during the transmission and reception of signals. Such behavior limits the performance of certain communication, radar, and sensing systems and hinders the handling of unwanted interferences and jamming signals that might block the device.

Researchers at the University of California, Davis have developed nonreciprocal and reconfigurable phased-array antennas based on time-modulation. This technology permits to construct antennas able to independently control their transmission and radiation patterns at the same operation frequency without requiring any magnetic component. Such response opens new opportunities to enhance the channel capacity in wireless systems, mitigate cross-talking and mutual-coupling effects in electromagnetically crowded environments such as roof of building, ships, and aircraft, and boost the performance of sensors and radar systems. The resulting devices are very efficient and require relatively minor modifications on standard phased-array systems.

APPLICATIONS

- ▶ Enhance channel capacity in communication systems
- ▶ Mitigation of cross-talking and mutual coupling effects in electromagnetically crowded environments (roofs of building, ships, aircrafts, integrated chips, etc.).
- ▶ Handle interferences and jamming signals in primary radar and wireless networks
- ▶ Sensors

FEATURES/BENEFITS

- ▶ Independent control of transmission and reception radiation patterns at the same frequency
- ▶ Reconfiguration capabilities
- ▶ Applicable to different resonant antennas across the electromagnetic spectrum
- ▶ Simple and efficient

PATENT STATUS

Country	Type	Number	Dated	Case
United States Of America	Issued Patent	11,791,555	10/17/2023	2019-452
United States Of America	Issued Patent	11,545,749	01/03/2023	2019-452

ADDITIONAL TECHNOLOGIES BY THESE INVENTORS

- ▶ [Nonreciprocal Reflectarray Antennas based on time-modulation](#)
- ▶ [Broadband Light Emission with Hyperbolic Material](#)

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INVENTORS

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OTHER INFORMATION

KEYWORDS

Phased array antennas,
 non-reciprocity, time-
 modulation

CATEGORIZED AS

- ▶ **Communications**
- ▶ Optical
- ▶ Wireless

RELATED CASES

2019-452-0

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