Scalable Phased Array Standing Wave Architecture

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ABSTRACT

Researchers at the University of California, Davis have developed a standing wave architecture for scalable and wideband millimeter wave and terahertz radiator and phased arrays.

FULL DESCRIPTION

Current applications of millimeter wave (mm-wave) and terahertz (THz) frequency regimes are spectroscopy, imaging, radars and short range communication. Although successful, these methods demand power generation, radiation with sufficient radiated power and frequency control, and are both bulky and expensive. Even harmonic oscillators, employed in phased arrays to overcome the frequency, have the limited generation capabilities of transistors and require an array of sources in order to extract sufficient output power.

Researchers at the University of California, Davis have developed a standing wave architecture for scalable and wideband mm-wave and THz radiator and phased arrays. This new structure continuously distributes coherent arrays that avoid lossy and parasitic coupling networks and can easily be scaled by extending the size of the structure and replicating the unit cell. In addition, the structure enables the use of wide beam steering and high power radiation in phased arrays while completely avoiding the use of lossy phase shifters needed in conventional phased arrays. By completely removing the need for coupling circuitry and phase shifters between different elements in an array, this structure provides a cheaper and more efficient solution while being able to scale the array with no theoretical limits and having higher power arrays.

APPLICATIONS

- Standing wave architecture for scalable and wideband millimeter wave and terahertz radiator and phased arrays

FEATURES/BENEFITS

- Expandable arrays
- Maximized tuning range
- Maximized output power of each individual source
- Continuous distribution
- Easily scalable
- Eliminates need for lossy phase shifters

PATENT STATUS

Country	Type	Number	Dated	Case
United States Of America	Issued Patent	10,998,855	05/04/2021	2017-558

CONTACT

Andrew M. Van Court
amvancourt@ucdavis.edu
tel: .

INVENTORS

- Jalili, Hossein
- Momeni, Omeed

OTHER INFORMATION

KEYWORDS

coherent power radiation, frequency tuning range, harmonic oscillator, millimeter-wave, terahertz, THz, circuits, phased array, standing waves, wideband power generation

CATEGORIZED AS

- **Communications**
  - Other
  - Wireless
- **Engineering**
  - Engineering
  - Other

RELATED CASES

2017-558-0

ADDITIONAL TECHNOLOGIES BY THESE INVENTORS

- Ultra-High Range Resolution Doppler Radar Front End With Quadrature-Less Coherent Demodulation
- Field Effect Bipolar Transistor
- Low Energy and Noise Sub-Sampling Phase-Locked Loop
- High-Frequency Imaging and Data Transmission Using a Re-configurable Array Source with Directive Beam Steering
- Hybrid Electromechanical Metamaterials for Optical and Electrical Devices
- Phased-Locked Loop Coupled Array for Phased Array Applications

- Embedded Power Amplifier
- Reducing Electrical Current Variations in Phase-Locked Loop Systems

University of California, Davis
Technology Transfer Office
1850 Research Park Drive, Suite 100, ,
Davis,CA 95618

Tel: 530.754.8649
techtransfer@ucdavis.edu
https://research.ucdavis.edu/technology-transfer/
Fax: 530.754.7620