

Acoustic holographic reconstruction with metamaterials

Value Proposition

To date, most acoustic holographic reconstruction techniques rely on transducer arrays with large numbers of active elements, requiring sophisticated phase shifting circuits, large power consumption and careful calibration and tuning. Therefore, passive acoustic holograms, that are similar to conventional optical holograms, can greatly simplify the system and significantly reduce the overall cost.

Technology

A new Duke invention has been developed which uses passive metamaterials as subwavelength pixels for holographic reconstruction. This is intended to be used in applications such as wireless ultrasound transfer (e.g. wireless power transfer), ultrasonic sensors for smart vehicles, medical therapeutic ultrasound applications, and audio speakers. It requires only a single transducer, without cumbersome circuitry, thus significantly reduces system complexity and power consumption. A prototype was demonstrated around 4kHz audible frequency range. These metasurface holograms can serve as versatile platforms for various advanced acoustic wave manipulation and signal modulation, leading to new possibilities in acoustic sensing, energy deposition, medical diagnostic imaging and haptic holography.

Advantages

- Compact and simple design
- Less power consumption
- Low cost

Publications

- [Acoustic holographic rendering with two-dimensional metamaterial-based passive phased](#) (Sci. Rep., 2016)

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Links

- [From the lab of Prof. Steven Cummer](#)

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Patents

Patent Number: 16/327,019

Title: SYSTEMS AND METHODS FOR 2D ACOUSTIC
METASURFACE FOR HOLOGRAPHIC RECONSTRUCTION

Country: United States of America