

Method and Apparatus to Attain Controlled Bending of Acoustic Beams using Active Acoustic Metamaterial

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ABSTRACT

A method (300) and apparatus (201) to attain bending of acoustic beams using metamaterial is disclosed. The method (300) includes a scatterer array (104) is formed in a matrix material. The scatterer array (104) is placed between a sound transmitter and a sound receiver. The scatterer array (104) includes a plurality of scatterers (102). The plurality of scatterers (102) of the scatterer array are moved in angular, radial inward and outward directions to secure a suitable position to attain the bending of the plurality of incident acoustic beams.

KEY APPLICATION AREAS

1. Acoustic Metamaterials.
2. Noise Control & Acoustic Barriers.
3. Ultrasound & Acoustic Imaging.
4. Non-Destructive Testing (NDT).
5. Biomedical & Material Microscopy.
6. Wave Manipulation & Cloaking Technologies.

POTENTIAL USE

1. Programmable acoustic lens for beam steering, focusing, and broadband wave control.
2. Adaptive acoustic barrier for noise reduction and sound isolation across a wide frequency range.
3. Ultrasound imaging and biomedical microscopy with enhanced acoustic beam manipulation.
4. Material microscopy and non-destructive testing (NDT) using actively controlled acoustic waves.
5. Acoustic cloaking systems for manipulating sound propagation and concealment.
6. Programmable wave-control devices capable of switching between acoustic lens and acoustic barrier functionalities.
7. Advanced sensing and communication systems requiring dynamic acoustic wave steering, collimation, and negative refraction.