Reprogrammable Metasurfaces

This technology offers reprogrammable metasurfaces for tailoring mechanical material properties. This system is rapid and repeatable to fit new applications, eliminating redesign.

What is the Problem?

Current mechanical metamaterials enable unique, tailorable material properties and responses. Custom designed materials with programmable elastic properties, tunable vibration mitigation capabilities, and custom deployable topologies all offer transformative possibilities in a wide range of industries. However, these structures are generally designed for a single specific task. For every additional adjustment, they need to be redesigned and refabricated.

What is the Solution?

The solution is reprogrammable metasurfaces. These are a new class of mechanical metamaterials that can be repeatedly reprogrammed after fabrication to match specific conditions. This allows for tailored shape changes in metamaterials by introducing selective biasing forces within a lattice structure, hence inducing buckling patterns that match predetermined profiles. This structure can be rapidly reprogrammed to transform into a wide range of desired shapes and profiles. This has applications for "E-ink" for blind people, for tactile phone displays, for meta-surfaces of programmable textures, and for robotic grippers.

What is the Competitive Advantage?

Current mechanical metamaterials offer tailorable material properties but must be designed for a specific task. Redesigning for each task increases costs and limits adoption of this technology. This solution allows for rapid reprogramming to fit a new use case that has a different range of shapes and profiles, eliminating the time intensive redesign for each new application.

Patent Information:

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References

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Category

Materials/2D Materials
Materials/Other
Selection of Available Technologies

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