Spatiotemporally Programmable Surfaces

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Purpose

The purpose of this research is to study the characteristics of both elastic and viscoelastic materials to determine how their deformations over time can be used to our advantage.

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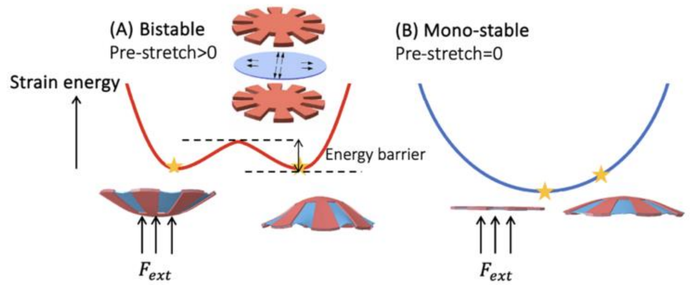
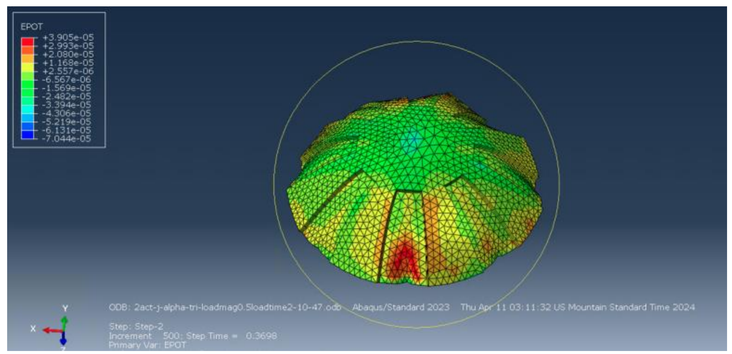
Objective: Harvest wave energy from the deformation of elastic materials.

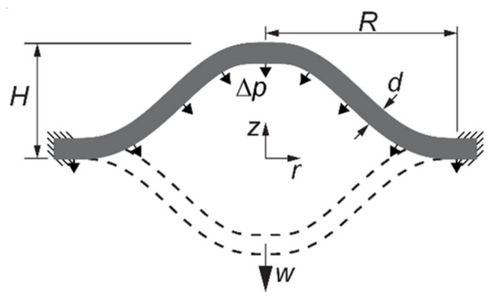


How it works: A pre-stretched elastic membrane with 2 solid structures attached on the top and bottom cause the device to have 2 static positions. Wave motion causes the change between static states. The device harvests electricity from the change in static shapes.

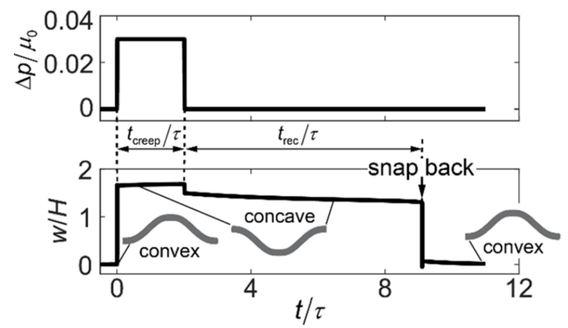


Spatiotemporally Programmable Surfaces

Objective: Manipulate and study changes in characteristics of viscoelastic using pressure loads.



How it works: Monostable viscoelastic materials have a static position and second temporary static position. Using a makeshift vacuum chamber, we can create pressure differences causing the material to enter to temporary static position. Studying its deformation over time can give us insights to the best geometric configurations.



Future Work

- Optimize geometry, elastic characteristics, and resulting deformations to harvest larger amounts of energy
- Obtain optimal structural configurations from a series of experiments
- Integrate into soft robotic applications

Acknowledgments

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References

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