Switchable Bistability in 3D Printed Shells

Katherine S. Riley, MS/PhD, Mechanical Engineering
Professor Andres F. Arrieta
riley104@purdue.edu

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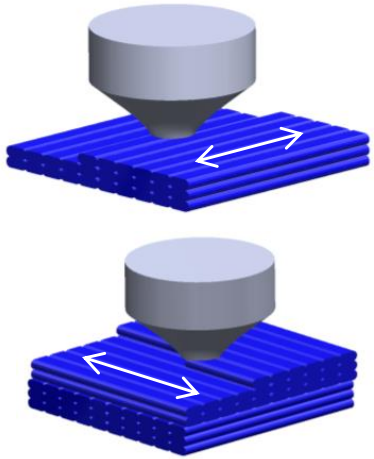
Project Description

- How can we combine contrasting pre-stress with polymer shape memory to achieve 3D printed bistable structures?

Approach

- Program distributed pre-stress fields into a bilayer shell via FDM 3D printing by taking advantage of the shape memory effect.
- Characterize the material properties to determine how to maximize pre-stress and performance
- Perform finite element analysis to model deformation behavior

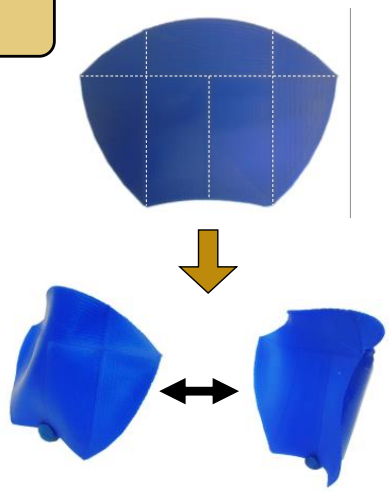


Discussion

- **Switchable bistability** – stability and load carrying behavior may be reversibly changed with temperature

Results

- Switchable bistable structures exhibit fast morphing, high load carrying capability, and low snapping force
- Geometric freedom of 3D printing allows for the creation of complex geometries and pre-stress fields



Switchable bistability combines high load carrying capability with low snapping force.