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Effect of re-entrant auxetic core on the ballistic response of hemispherical sandwich shell structure

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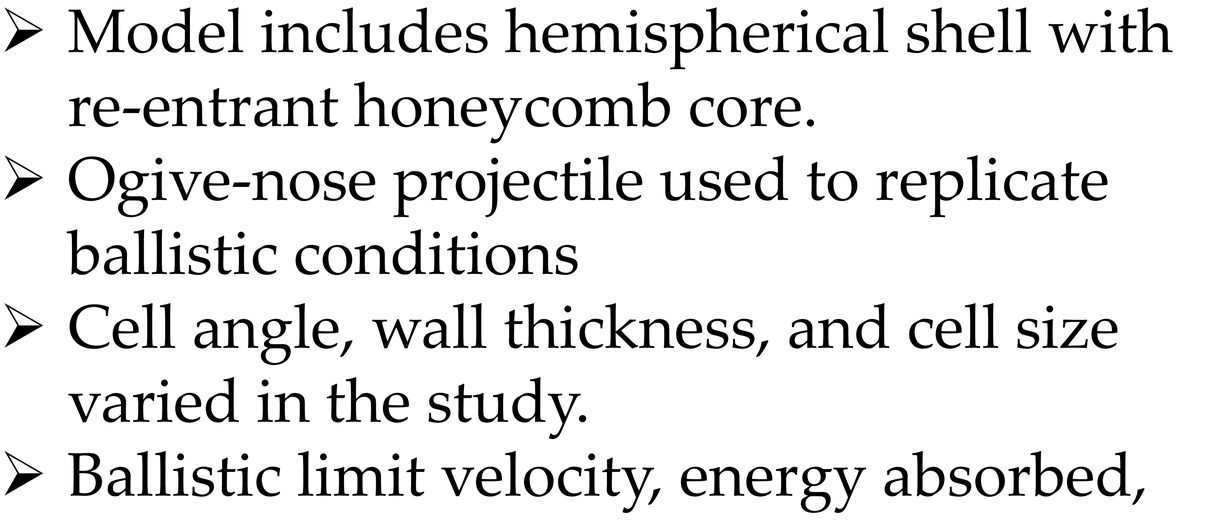
Introduction

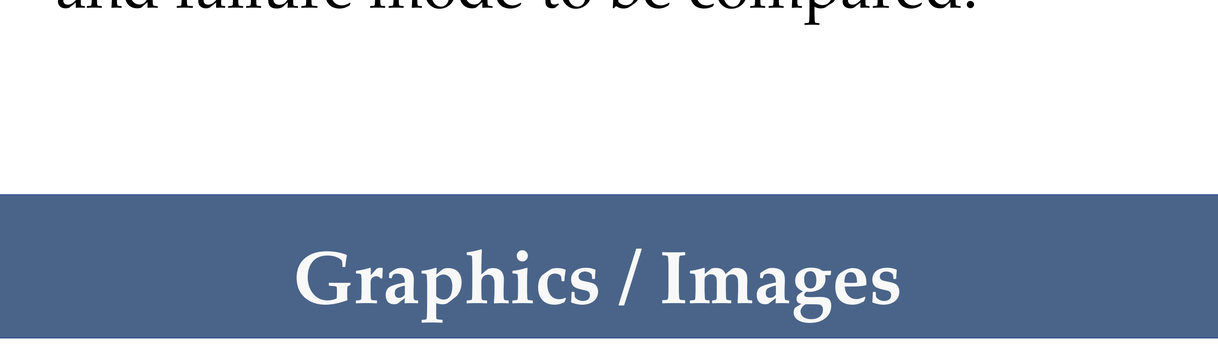
- Hemispherical sandwich shells: strong, lightweight, better impact-resistant.
- Defense, automotive, aerospace applications.
- Re-entrant honeycomb (auxetic) vs. hexagonal.
- Improve ballistic resistance & energy absorption.

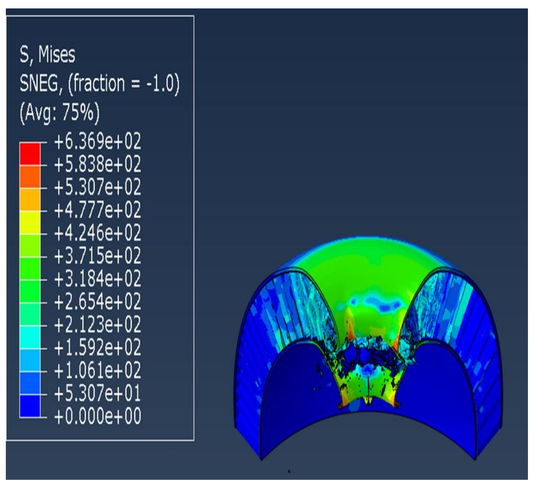
Methods

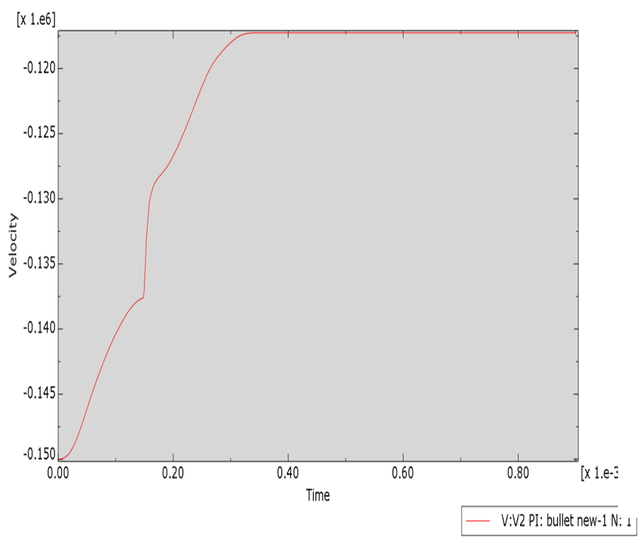
- Simulations done using ABAQUS/Explicit for high-velocity impacts.
- Model includes hemispherical shell with re-entrant honeycomb core.
- Ogive-nose projectile used to replicate ballistic conditions
- Cell angle, wall thickness, and cell size varied in the study.
- Ballistic limit velocity, energy absorbed, and failure mode to be compared.

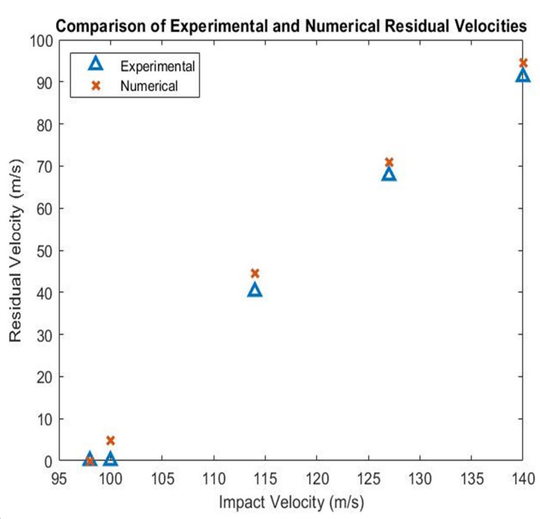
Graphics / Images

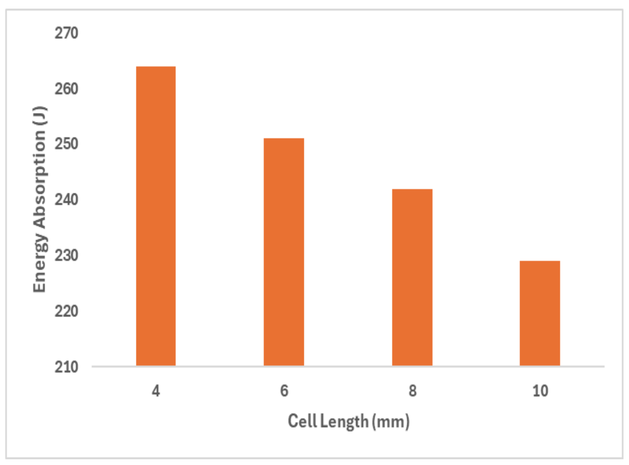


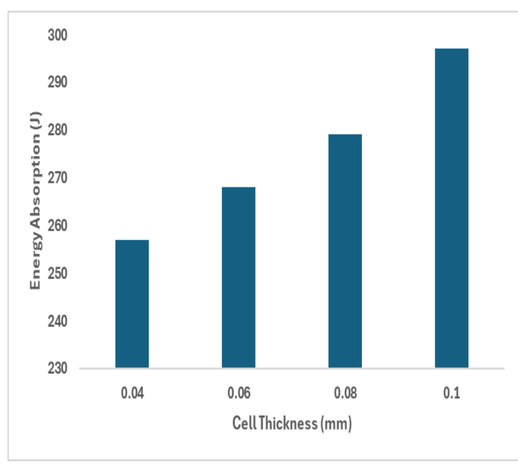












Conclusions

- Re-entrant cells provide better ballistic resistance and energy absorption than hexagonal honeycomb structures.
- Energy absorption decreases with an increase in cell length.
- Energy absorption increases with a decrease in cell thickness.
- Energy absorption increases when the cell angle is varied up to a certain limit.