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Fracture Fatigue and Wear

Topology-Optimized Auxetic Core for Blunt Trauma Mitigation in Ballistic Armor

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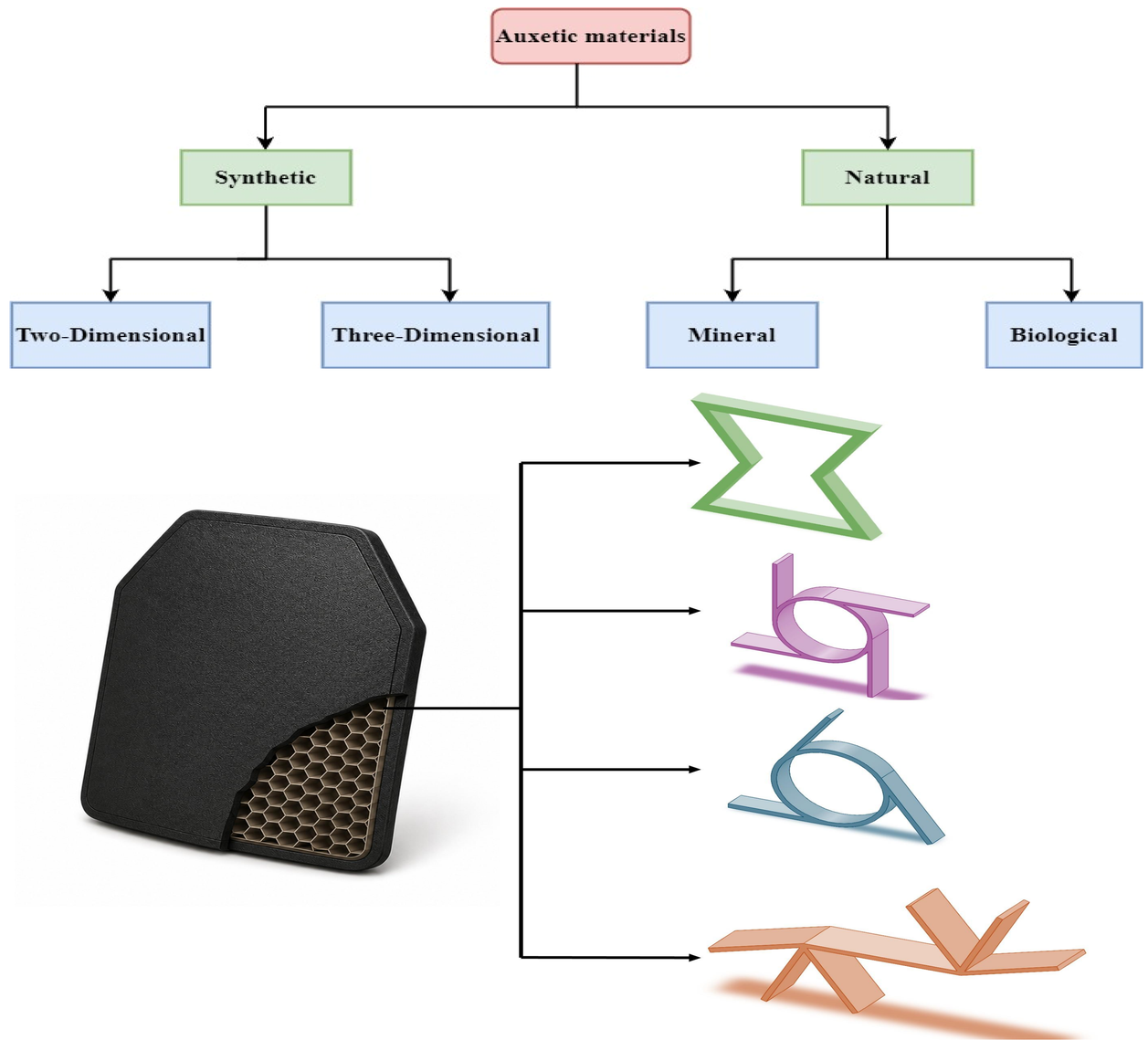
Introduction

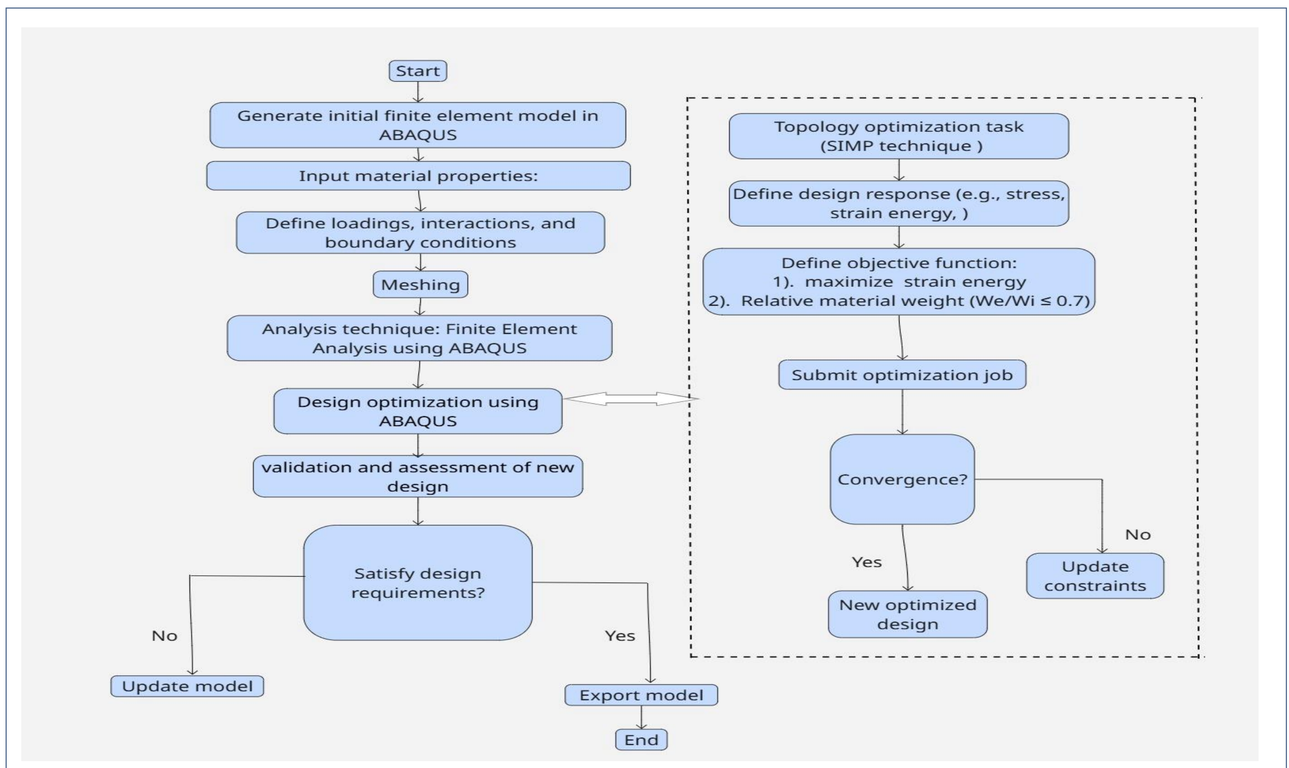
- Blunt trauma occurs due to armor back-face deformation.
- Conventional cores show limited energy absorption.
- Auxetic structures improve energy dissipation and stress distribution.
- Topology optimization helps design efficient auxetic armor cores.

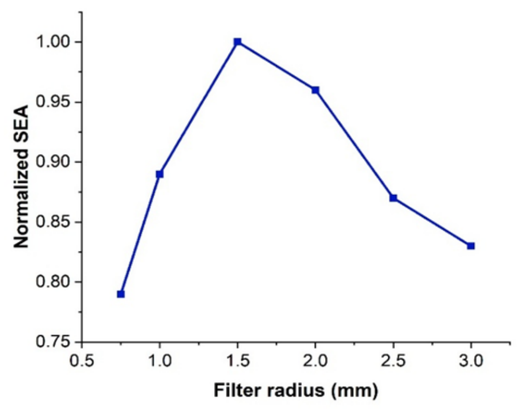
Methods

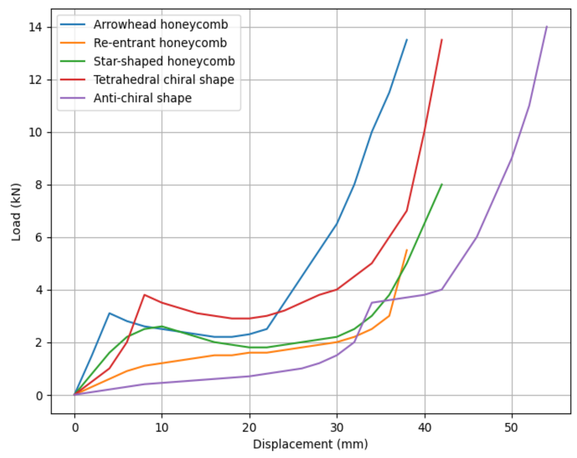
- The study focuses on blunt trauma mitigation techniques in ballistic armor.
- Improving energy absorption and reducing back-face deformation.
- Topology optimization of auxetic core parameters.
- Evaluation of energy absorption and transmitted force.

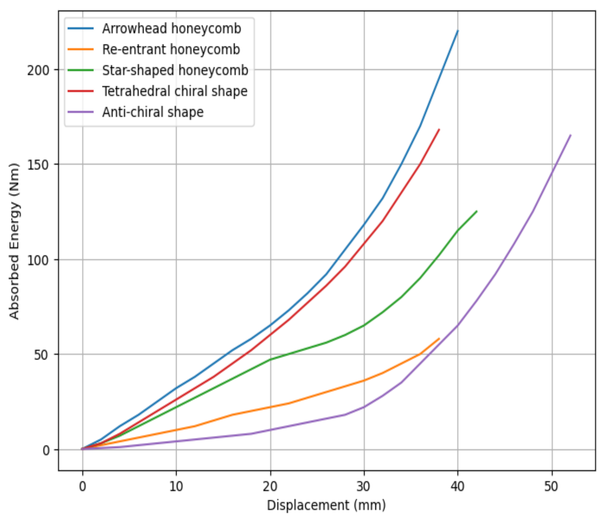
Graphics / Images

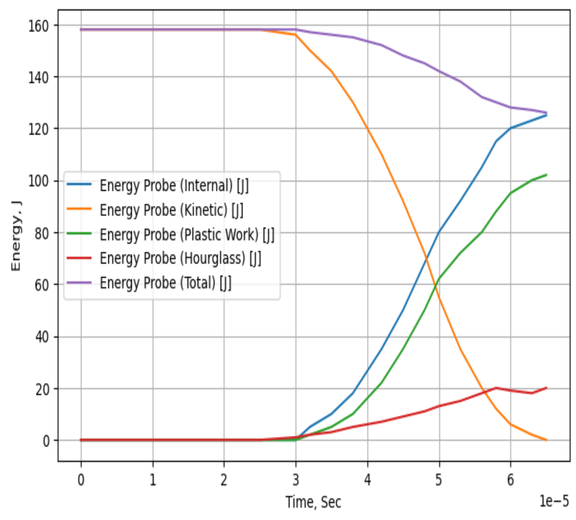












Conclusions

- Auxetic core structures significantly improve impact energy absorption during ballistic loading.
- Enhanced stress redistribution helps reduce blunt trauma and transmitted force.
- Arrowhead and chiral honeycomb geometries minimize back-face deformation.
- Topology optimization improves the structural efficiency of auxetic armor cores.
- Lightweight auxetic cores show strong potential for ballistic armor.