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Optimization of Auxetic Honeycomb Cell Parameters for High Energy Absorption

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Abstract. Researchers have lately demonstrated an increased interest in sandwich plates incorporating cellular cores due to their distinctive characteristics such as light weight, high energy absorption and stiffness [1]. The combination of auxetic honeycomb sandwich structures and nanoplates opens significant options in aerospace industry by improving mechanical properties. However, their full potential has yet to be discovered. The sandwich plate structures consist of an auxetic honeycomb core layer with a negative Poisson's ratio and two skin layers reinforced by Graphene Nanoplatelets (GNPs) or other materials [2]. The high energy absorption of these sandwich nanoplates is important for their structural integrity, minimizing damage and good vibration damping properties. Geometrical characteristics such cell re-entrant angle, beam length, height, and thickness can have varying impacts on the energy absorption of these sandwich nanoplates. Optimization techniques on maximizing energy absorption of auxetic honeycomb cells can be employed to get optimal geometric parameters while considering the design constraints. Furthermore, the comparative study can also be carried out to investigate the energy absorption capabilities of various honeycomb materials.

References

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