

## Energy Absorption of Bio-Inspired Rotating Square Auxetics—An Experimental Study

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### ABSTRACT

This study presents experimental results from tensile tests conducted on a recently introduced bio-inspired rotating square auxetic. A previously developed numerical framework highlighted that the fine-tuned geometry demonstrated excellent specific energy absorption under tension. In this work, the optimized geometry was fabricated and tested to assess the accuracy of the developed framework. Specimens were manufactured from aluminum sheets and tested under quasi-static tension. Customized boundary grips were designed to accommodate the auxetic's lateral expansion during tensile loading. The results showed strong agreement between the experimental data and numerical predictions, with an error of less than 3% for specific energy absorption. The findings validated the numerical framework, demonstrating the auxetic's suitability for high-energy absorption scenarios. Its potential use as a fuse-like member in earthquake-resistant structures is discussed.