Fracture and Deformation of Materials Under Extreme Conditions

Andrew Baumgardner, mentor Dr. Nathan Spulak
Department of Mechanical and Aerospace Engineering

Overview
The shear strength of anisotropic materials under high rate loading is a difficult property to measure. The goal of this project was to use finite element analysis and experimental testing to design a new high rate shear test method for fiber-reinforced composites (FRCs).

Motivation
FRCs are greatly used in many fields, especially aerospace, due to their strength-to-weight ratio. Improved knowledge of their deformation and fracture behavior during high-rate loading will be used to enhance the crash-worthiness and safety of aircraft and automotive vehicles.

Key Findings
A new test method was successfully implemented for low rate shear loading of FRCs. Tight tolerances and strong adhesives were essential. Future work involves adapting this new method to high rate loading.

Usefulness
This test can further be used by researchers to investigate the effects of strain rate on the deformation and fracture of FRCs. This allows more accurate simulation models to be designed. Which will improve the safety of aerospace structures.

References

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