FEA Based Analysis of Spidron Fractal Structures in Force Absorption Applications

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The purpose of this project is to act as a preliminary study of the relationships and properties of multivariable spidron fractals as generated via a novel method. To understand the effect that different input values have on impact absorption performance metrics (displacement, impulse, impact duration, and energy efficiency) and discover new methods to utilize the variability of fractal geometry to suite a variety of design considerations in automotive design. This project aims to investigate and quantify the usefulness of spidron structures in force absorption applications, as evaluated by the Finite Element Method. This modified form of the spidron system shows great promise in the realm of impact absorption on account of the great variety of controllable and modifiable structural properties they exhibit that have bearing on structural performance. While the testing and evaluation of all the possible spidron shapes are limited, the data here is sufficient enough to confirm that the variety in visual appearance of spidron structures also translates into a variety in spidron structural performance. Because the data confirms that the structural performance of the spidrons can be highly variable, and because the spidron system consists of a vast pool of usable structures, it is reasonable to conclude that with some more refinement, spidron structures could support a wide range of specific usage cases in a variety of related fields, and that the complex variability of the spidron system allows solutions to be derived to suit almost any specific implementation.

Awards Won:

Fourth Award of $500