

ABSTRACT

Biomimicry is a discipline incorporating the understanding of biological structures into technological advancement. The implementation of the structure includes the development of composite material design by integrating the helicoidal structures, known for its remarkable strength and durability. The effect of the design parameters on the strength of the helicoidal structures has been well established by the previous research. In the present study, the combinations of the design parameters (i.e., number of layers, layer thickness and fibre orientation) were utilised to design the helicoidal structures built from the fibre reinforced polymer (CFRP). The design combinations were selected using the full-factorial method, and the effect of such combinations to the ultimate tensile strength of the structures was simulated by ABAQUS. Finally, the best design combinations obtained from this study was exhibited by the structure with 6 layers of 0.75 mm thick CFRP and using 0/30/60/90 fibre orientation, also determined fibre orientation as the most significant parameters. This result may provide further information on the impact of implementing biomimicry concept to the industrial challenge.

Keywords – Composite material, Helicoidal structure, Full-factorial, Ultimate Tensile Strength, ANOVA