**Numerical and Experimental Investigation on Mechanical Properties of Additive Manufactured Cellular Lattice Structures**

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**ABSTRACT**

Cellular lattice structures are low dense and highly porous in nature, mainly these are effective in strength to weight ratio. Due to strength to weight ratio, cellular lattice structures are able to sustain at high compressive loads and exhibits better mechanical properties. These lattice structures are manufactured through additive manufacturing (AM) technology. The AM is cutting edge technology to manufacture complex structures, which cannot possible through traditional manufacturing methods such as casting, forming, machining etc. The FCC and Star type lattice structures are fabricated through FDM technology with poly lactic acid (PLA) material. The mechanical properties of ASTM standard specimen in three different build orientations i.e. X, Y and Z such as young’s modulus, and compressive strength and strain are calculated experimentally. These standard specimen results are used to find the mechanical properties of cellular lattice structures with FEM and consequently the experimentation has been done. These experimental results are compared with finite element analysis results and validation has been done. The mechanical properties of experimental and simulation results are observed with a good agreement of 5-10% in FCC lattice structure and 40-50% deviation is observed in star type lattice structure. From these results concluded that the FCC lattice structure exhibits higher stiffness compared to Star type for high strength applications.

*Keywords: lattice structure; young’s modulus; FEM; stiffness; PLA; build orientation.*