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Compression behaviors of 3D printed pyramidal lattice truss composite structures

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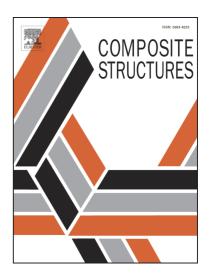
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Compression behaviors of 3D printed pyramidal lattice truss

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2	composite structures
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8	Abstract: The lattice truss structure is a porous lightweight periodic structure with high
9	specific stiffness and specific strength. In this research, pyramid lattice truss structures
10	were designed and manufactured by three-dimensional (3D) printing technology
11	through horizontal printing and vertical printing manners, respectively. Quasi-static
12	axial compression tests were conducted to study the mechanical properties and energy
13	absorption of the pyramidal lattice truss structures. These two types of printed lattice
14	truss materials had close strength and rigidity. However, the vertically printed lattice

truss structures had excellent ductility and their struts never broken off during

compression. Three post failure styles of the vertically printed lattice truss structures

were observed, including strain-hardening, stable deforming and softening and

depending on the slenderness ratio of the strut. Theoretic analysis and finite element

method (FEM) were performed to investigate the compression behaviors of the

vertically printed lattice truss materials. Appropriate printing method and relative

density could make the 3D printed pyramidal structures achieve excellent specific

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