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X-cor夹层结构压缩性能研究

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Study on Compressive Properties of X-cor Sandwich Structures

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摘要

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摘要 X-cor结构是一种采用拉挤复合材料细杆(Pin)以三维网架结构形式增强泡沫的新型夹层结构材料,该夹层结构与传统泡沫夹层结构和蜂窝夹层结构相比,具有很高的比强度和比刚度。为了研究Pin植入角、Pin直径对X-cor夹层结构压缩强度和压缩模量的影响,压缩性能试样采用Rohacell 31泡沫作为芯材,Pin采用0.5 mm和0.7 mm两种不同直径的T300/FW 63碳/环氧拉挤细杆,并将实验结果与不含Pin增强的泡沫夹层结构进行了对比。研究表明,Pin的存在极大提高了X-cor夹层结构的压缩强度、压缩模量,同时密度仅小幅度提升;Pin对X-cor夹层结构压缩性能的增强效率随Pin植入角的减小而提高,采用小直径的Pin更利于提高X-cor夹层结构压缩性能。

关键词: 夹层结构 X-cor 压缩试验 压缩强度 Pin植入角

Abstract: X-cor sandwich, a novel structural material made by reinforcing lightweight foam with pultruded Pins oriented in a three dimensional truss network, possesses high specific strength and specific stiffness compared with honeycomb sandwich and traditional foam core sandwich. To experimentally study the influence of Pin's angle and diameter on the compressive strength and compressive modulus of X-cor sandwich structures, the specimens of compressive test were made of the Rohacell 31 foam core and the Pins with two kinds of diameter in 0.5 mm and 0.7 mm respectively consisted of T300/FW 63 carbon/epoxy with pultrusion process, and test data were compared with foam core sandwich structures without Pin reinforced. The results show that Pin can obviously enhance the compressive strength and compressive modulus of X-cor sandwich structures, with only a slight increase in density. The efficiency of Pin reinforcing the compressive property of X-cor sandwich structures increases as Pin's angle decreases. Compared with big diameter Pin, small diameter Pin promises a higher efficiency in reinforcing compressive properties of X-cor sandwich structures.

Keywords: sandwich structures X-cor compressive test compressive strength Pin's angle

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