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硅橡胶填充泡沫铝层合管的压缩和吸能性能

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摘 要: 采用挤压法在开孔泡沫铝中充填硅橡胶, 以硅橡胶填充开孔泡沫铝为芯、铝管和钢管为面板制备层合管, 研究了静态压缩条件下充填硅橡胶后泡沫铝及其层合金属管的变形行为和能量吸收性能。研究表明: 在泡沫铝中充填硅橡胶后, 泡沫铝的平台区比原来增高、增长, 其吸能性能也得到提高; 由于泡沫铝的充填, 钢管的变形方式发生改变, 由不对称屈曲转变为轴对称屈曲; 充填硅橡胶的泡沫铝层合金属管具有比原来更高的屈曲褶皱载荷, 且屈曲褶皱的产生滞后, 其吸能性能也得到提高, 硅橡胶充填对层合钢管的影响比对层合铝管的影响更明显。

关键字: 泡沫铝; 硅橡胶; 层合管; 力学性能; 吸能性能

Compression capability and energy absorption of foam aluminum cylinder sandwich with silicone rubber

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Abstract: Silicone rubber was extruded into foamed aluminum, then cylinder sandwich was produced when using foamed aluminum filled with silicone rubber as core, aluminum tube and steel tube as panel. The compression deforming activity and energy absorption ability of aluminum foam with silicone rubber and rubber cylinder sandwich with silicone rubber were studied. The results indicated that the length and height of plateau region of aluminum foam with silicone rubber is increased and the energy absorption ability is improved. The deforming mode of the steel tube filled with foamed aluminum is changed from “diamond mode” to “circular mode”. For cylinder sandwich filled with silicone rubber, higher load is needed to create fold, and the appearance of fold is lagged, the energy absorption ability is improved. The influence of filled with silicone rubber is more obvious on steel cylinder sandwich than on aluminum cylinder sandwich.

Key words: foamed aluminum; silicone rubber; cylinder sandwich; mechanical properties; energy absorption ability

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