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研究论文

多孔铝合金连通孔对压缩性能的影响

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摘要：

根据多孔铝渗流制备过程中孔结构的形成规律建立了单元模型， 其中改变渗流压力引起的通孔度变化所产生的孔隙率变化规律符合物理模型. 通过对不同孔隙率的孔结构单元模型计算， 结合实验研究了孔隙率变化引起的孔结构变化， 并计算了通孔多孔铝力学性能的影响规律. 结果表明, 模型计算得到的材料弹性模量、塑性变形平台应力与实验结果基本相符, 孔与孔之间通孔度的变化决定了通孔多孔铝的孔隙率变化, 受压缩时在连通孔处的应力集中是其力学性能对孔隙率敏感的直接因素.

关键词： 金属材料 多孔铝合金 通孔度 孔结构模型 压缩力学性能

Effect of “through-hole” on porous aluminum alloy compressive mechanical properties

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Abstract:

In accordance with preparation process of open-cell aluminum foam, a novel simplified model of pore s structure was proposed to exploit the performance of the through-holes, which connect neighboring cells, on the elastic module and compressive collapse stress of porous aluminum alloy. It is shown that the results coincide with experiments in terms of elastic module and plastic collapse stress. Stress concentration neighboring the through-hole between neighboring cells was manifested by unit cell model. On account of significant effect of through-hole’s variation on porosity, the sensitivity of mechanical properties of open-cell aluminum alloy on porosity could be explained by stress concentration on the through-hole between neighboring cells.

Keywords: metallic materials porous aluminum alloy interconnected hole pore structure model compressive mechanical properties

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