

论文

初始压应力场对爆生裂纹行为演化效应的实验研究

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摘要:

采用自主设计的动静组合加载系统, 实现了在模型试件中产生静态应力场和爆炸动应力场, 并对动静组合应力场中爆生裂纹的扩展行为演化特征进行焦散线实验研究, 探讨初始应力场对爆生裂纹扩展规律的影响效应。通过对四周施加均布载荷和不施加载荷的两组试件进行实验, 对比分析两组试件中爆生裂纹的扩展长度、速度和裂纹尖端动态应力强度因子随时间的变化规律, 发现在垂直于裂纹扩展方向的压应力降低了裂纹尖端的应力集中程度, 阻碍了裂纹的扩展, 而平行于裂纹扩展方向的压应力对裂纹的扩展基本没有影响。

关键词: 初始压应力场; 爆生裂纹; 焦散线实验; 应力强度因子

Experimental study on the effect of initial compression-stress field on blast-induced crack behaviors

Abstract:

With self designed static dynamic loading setup which can produce initial static stress and dynamic blasting stress field in the specimen, the behaviors of blast induced crack in the dynamic static stress field were studied by caustics experiment and the effect of initial stress field to the blast induced crack was discussed. Two specimens, one is applied nothing and the other is applied 4 direction pre compression loading, were studied by caustics. It is established that the pre compression stress, which is vertical to the crack propagation direction, reduces the stress concentration degree at crack tip and hinders the crack propagation, but the pre compression stress, which is parallel to the crack propagation direction, has no influence on the crack propagation.

Keywords: initial compression stress field; blast-induced crack; caustics experiment; stress intensity factor(SIF)

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