J积分移动理论的单边径向裂纹轴校直行程算法

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关键词： 轴 校直 裂纹 算法

摘　要： 依据弹塑性断裂理论和实验，研究了含裂纹轴中最危险的单边径向裂纹轴校直过程，提出了多步加载条件下的J积分移动理论和单边径向裂纹轴校直行程递推算法。含单边径向裂纹轴校直中，假设多步加载相互独立，J积分包括Je和Jp两项，微小递增的弹塑性载荷导致裂纹钝化有助于JIC增加，J积分值在多次加载中可缓慢向上移动。基于这一观点，结合校直行程递推算法，建立了单边径向裂纹轴的多步校直行程递推算法。对裂纹为3mm的单边径向裂纹轴实验的结果表明了JIC移动现象，并且在对实验轴4步校直后，初始0.13mm弯曲值可以减少到0.01mm，而裂纹嘴张开位移限制在0.008mm。 The J-integral moving theory with multiple loading and shaft straightening stroke increasing algorithm with single-edged crack were presented according to the elastic-plastic fracture mechanic theory and experiments analysis. During multi-step straightening, with the assumption of independent multiple loading, J-integral including two items of Je and Jp, and the crack blunting would promote the JIC increasing, the J-integral could be considered to move up slowly. Based on this view, the multi-step straightening stroke algorithm was built up to the shaft with single-edged crack. The straightening experiment resulted to the shaft with 3mm depth single-edged crack could prove the JIC moving phenomenon, and after 4 steps straightening to the experimented shaft, the initial 0.13mm bend value could be decreased to 0.01mm, while crack mouth opening displacement could be limited to 0.008 mm.

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