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研究论文

一种新型非调质钢弯曲疲劳性能的试样尺寸效应

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摘要:

使用液压伺服疲劳试验机考察一种新型(汽车前轴用)Nb+V复合微合金非调质钢的疲劳行为, 绘制出S--N曲线并分析了疲劳断口特征, 研究了其三点弯曲疲劳性能的试样尺寸效应及其原因. 结果表明, 试样的尺寸对非调质钢的三点弯曲疲劳性能有显著的影响, 其三点弯曲疲劳极限随着试样尺寸的减小而增加, 但是试样尺寸对疲劳试样的断口形貌几乎没有影响; 在三点弯曲疲劳试验中, 试样尺寸效应源于试样内部的应力梯度, 小尺寸试样的应力梯度比大尺寸试样的高.

关键词: 金属材料 三点弯曲疲劳 尺寸效应 微合金化 非调质钢

Effect of specimen size on bending fatigue behavior of a new kind of micro-alloyed forging steel

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Abstract:

The three–point–bending fatigue behaviors of a new kind of Nb+V micro–alloyed forging steel for truck front axle have been studied by hydraulic servo fatigue testing machine. The effects of specimen size on the fatigue behavior and its origin have been considered. The S–N curves were plotted and the fatigue cracked surfaces were analyzed by SEM. The results showed that the specimen size has a significant influence on three–point–bending fatigue limit. The three–point–bending fatigue limit of specimen increased with decreasing the specimen size. There is little effect of specimen size on the morphology of fatigue fractured surfaces. The reasons for this specimen size effect are that there exist stress gradient in specimen for three–point–bending fatigue test and that the stress gradient in a smaller specimen is larger than that in a larger one.

Keywords: metallic materials three–point–bending fatigue specimen size effect micro–alloying forging steel

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