

论文

3.5% NaCl中阴极极化下A537钢间歇超载疲劳断口分析

魏学军;李劲;刘素娥;柯伟

中国科学院金属腐蚀与防护研究所;金属腐蚀与防护国家重点实验室,沈阳,110015;中国科学院金属腐蚀与防护研究所;金属腐蚀与防护国家重点实验室,沈阳,110015;中国科学院金属腐蚀与防护研究所;金属腐蚀与防护国家重点实验室,沈阳,110015

摘要: 测量了A537钢在3.5%NaCl中阴极极化条件和不同间歇超载发生频率下的疲劳裂纹扩展曲线,并利用扫描电子显微镜对腐蚀疲劳断口进行了观察结果表明:超载对裂纹扩展速率及断口特征的影响取决于超载发生频率.当超载发生频率OCR=10(-1), 10(-2)时,间歇超载加速裂纹扩展,腐蚀疲劳断口只存在解理、沿晶等一般脆性特征;当OCR=10(-3), 2x10(-4), 10(-4)时,间歇超载对裂纹扩展存在阻滞效应,A537钢断口上能观察到铁素体、珠光体两种组织,且阻滞效应越大,两种组织越清晰.分析表明,这种断口形态的形成是氢在组织界面附近大量富集而使界面强度降低,铁素体、珠光体以不同方式开裂的结果.

关键词: 微观断口 超载 腐蚀疲劳

ANALYSIS OF FATIGUE FRACTURE WITH CYCLIC OVERLOADING FOR A537 STEEL IN 3.5% NaCl SOLUTION AT AN APPLIED CATHODIC POTENTIAL

WEI Xuejun;LI Jin;LIU Su'e;KE Wei (State Key Laboratory of Corrosion and Protection, Institute of Corrosion and Protection of Metals, The Chinese Academy of Sciences, Shenyang 110015)

Abstract: The fatigue crack propagation rate has been measured for A537 steel in 3.5%NaCl solution at an applied cathodic potential of -1400mV(SCE) under different cyclic overload occurrence ratio(OCR). The fracture surface characteristics have been analyzed by SEM. When OCR=10-1 and 10-2, the crack growth was accelerated and some brittle characteristics such as cleavage and intergranular cracking were observed on the fracture surface. However, for OCR=10-3,2x10-4 and 10-4, the crack growth was retarded, and the pearlite morphology appeared on the fracture. The difference of cracking models between ferrite and pearlite in A537 steel could be the enrichment of hydrogen atoms at the interphase of ferrite and cementite.

Keywords: fracture surface overload corrosion fatigue

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通讯作者:

作者简介:

作者Email:

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