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研究论文

316L不锈钢的高温疲劳蠕变行为和寿命预测

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摘要:

进行316L不锈钢在单级和两级载荷作用下的高温疲劳蠕变试验, 研究了载荷历程效应对材料行为的影响. 在已有统一的疲劳蠕变损伤演化模型基础上, 得到了316L高温单级载荷作用下非线性损伤演化曲线. 同时, 建立了一种耦合载荷历程效应的多级疲劳蠕变载荷作用下的材料破坏准则. 基于该破坏准则, 结合材料的非线性损伤模型对316L不锈钢高温两级载荷作用下的疲劳蠕变寿命进行了预测, 预测结果与试验数据符合得比较好.

关键词: 材料科学基础科学 寿命预测 破坏准则 疲劳蠕变 载荷历程

High temperature fatigue creep behavior and life prediction of 316L stainless steel under 2-step load

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Abstract:

High temperature fatigue creep test of 316L stainless steel under 1-step and 2-step load was conducted, the influence of the load history on material behavior was investigated emphatically. On the basis of the uniform fatigue creep damage evolution model, the nonlinear damage evolution curves of 316L steel under 1-step load at high temperature were obtained. A modified failure rule coupled with the load history effect under multi-step load was proposed. High temperature 316L steel fatigue creep life under 2-step load was predicted by the failure rule and the nonlinear damage model. The predicted results were in good agreement with the experimental ones.

Keywords: foundational discipline in materials science life prediction failure rule fatigue creep load history

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