

Cyclic creep behaviour and strain classification of a bainite 2.25Cr-1Mo steel at 455°C

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Abstract

Uniaxial static and cyclic creep tests are carried out on a bainite 2.25Cr-1Mo steel at 455°C. The dependence of cyclic response on varied unloading conditions is investigated, with unloading rates from 0.6 MPa/s to 39 MPa/s and the valley stress duration from 0 to 30 min. A systematic classification of strain components under cyclic creep is proposed to determine the actual damage. The results indicate that, the fracture modes under static and cyclic creep conditions both have ductile features. Due to the effect of anelastic strain recovery, the strain accumulation rate under cyclic creep is significantly retarded as compared with static creep, and the unloading conditions apparently influence the behaviour of anelastic strain recovery. Moreover, a life prediction method for cyclic creep tests based on mean actual strain deducted recovery strain is proposed.

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