

主 論 文 要 旨

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論文題名 **Multiaxial low cycle fatigue life of Mod.9Cr-1Mo steel notched specimen under nonproportional loading**

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主論文要旨

This paper presents the notch effect of Mod.9Cr-1Mo steel in multiaxial stress states. Tension-torsion multiaxial low cycle fatigue tests were performed using 11 strain histories for three types of notched specimens which have different notch radii, and crack initiation and failure lives were obtained. The crack initiation and failure lives were found being dependent on both strain history and elastic stress concentration factor.

Since a simple and reliable method for estimating the crack initiation and failure lives are needed in a practical design of high temperature components, the applicability of Neuber's rule was discussed. A new method of estimating the local strains at the notch root was proposed under multiaxial cyclic loading and the Mises strain, the maximum principal strain and the path strain were calculated from the local strains. These three strains together with the uniaxial low cycle fatigue data of unnotched specimens were applied to estimating the crack initiation and failure lives of the notched specimens. The path strain gave the best prediction among the three parameters.

Finite element analyses were performed for estimating the local strain. The Mises strain, the path strain and the nonproportional strain were also evaluated for determining the crack initiation and failure lives of the notched specimens. The Mises strain gave the most suitable strain for the two lives estimation.

The results obtained will contribute as a basis of the Design by Rule and Design by Analysis procedure for practical design of high temperature components.