

高クロム鋼のTypeIV損傷によるクリープ破断の余寿命評価/ゴムの構成式および劣化推定手法の検討

Study on Estimation of Remaining Life of High chromium Steel under Creep Damage / Study on Constitutive Equation of Rubber

キーワード : 高温強度、クリープ/粘塑性 key words : High temperature strength, Creep / Visco-plasticity

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●高クロム鋼のTypeIV損傷によるクリープ破断の余寿命評価

TypeIV損傷とは高温下で長時間の応力を受ける金属の結晶粒界に多数の空孔が生じ、連結し大きな亀裂となり破断する現象である。空孔の数、硬さや結晶粒サイズの変化、粒界のフラクタル次元の変化等をもとに破断までの時間を推定する手法を検討している。

●ゴムの構成式および劣化推定手法の検討

ゴムの応力ひずみ挙動を表わす改良VBOモデルを提案し更なる改良を行っている。また、1年間以上にわたる劣化試験を実施し、劣化後のゴムの応力ひずみ挙動を得て、構成式に用いる材料特性や変数の劣化による変化を得た。これらと劣化時間、劣化温度との関係を現在検討中である。

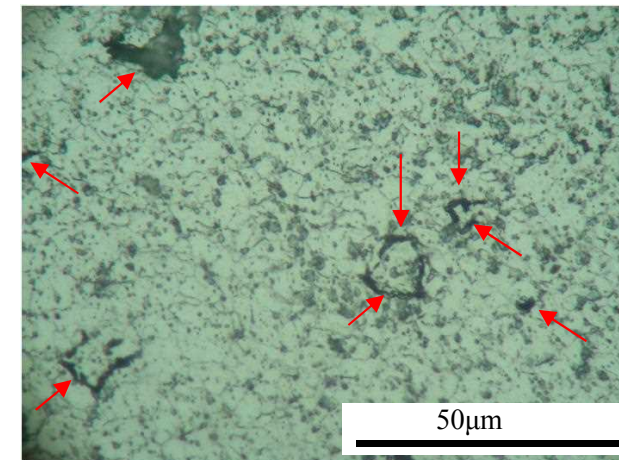


Figure 1 Creep Damage of High-Chromium Steel

Estimation of remaining life of Modified 9Cr-1Mo steel under TypeIV

creep damage: TypeIV Creep damage occurs in metal under stress for long time at high temperature. Many voids initiate on grain boundaries, coalesce and become large crack that breaks the component. The method that estimates when the component is broken is studied. It uses the number of voids and change of hardness, grain size and fractal dimension of grain boundary length as the clues.

Study on constitutive equation and deterioration of rubber : Improved VBO model that can describe the stress-strain behavior of the rubber was proposed and having been improved.

The deterioration tests for more than a year have been carried out and the mechanical properties and the variables of the model of the deteriorated rubber were taken. formulation of the relation of them and temperature and deterioration time are now studied.

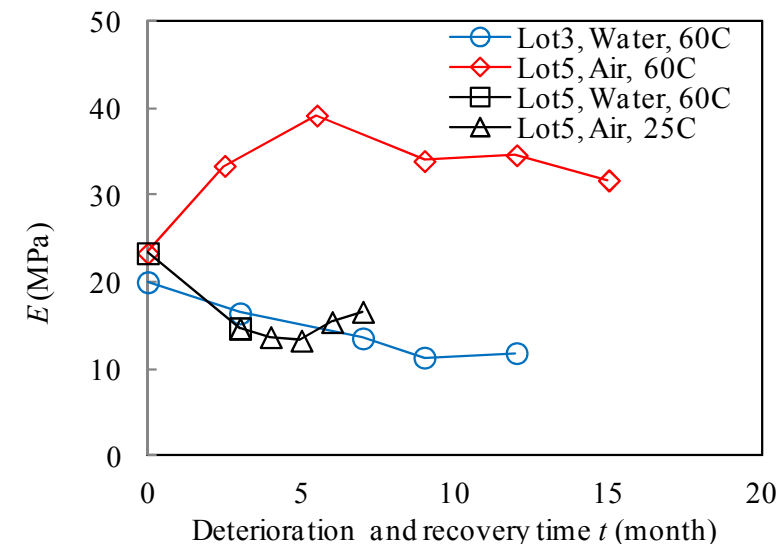


Figure 2 Deterioration of NBR