

# Constitutive Analysis of Ni-Base Superalloy Hastelloy X under Hot Compression Based on Thermodynamics

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## Abstract

Hot deformation characteristics of Hastelloy X Ni-base superalloy were investigated at elevated temperatures. Hot compressive tests were carried out in the temperature and strain rate ranges from 900 to 1150 °C and 0.001 to 1 s<sup>-1</sup>, respectively. The constitutive equation relating flow stress, temperature, and strain rate was obtained based on the peak stresses. The flow behavior showed that the softening mechanisms were related to the dynamic recovery (DRV) and dynamic recrystallization (DRX). The flow stress of Hastelloy X was fitted well by the constitutive equation of the hyperbolic sine function. The constitutive analysis suggested that the hot deformation mechanism of the Hastelloy X was dislocation creep.

Keyword : Hastelloy X superalloy, Flow behavior, Dynamic softening, Constitutive analysis