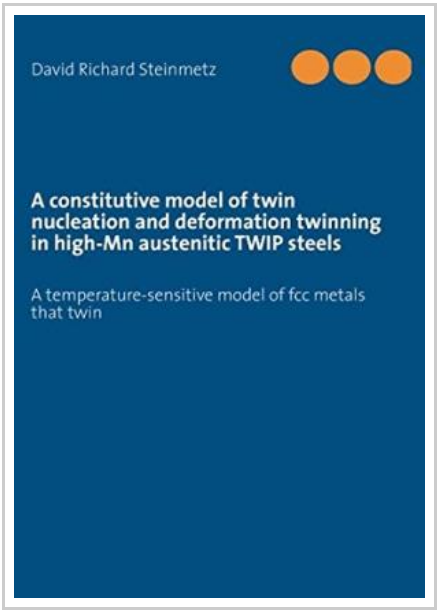

A constitutive model of twin nucleation and deformation twinning in high-Mn austenitic TWIP steels

By David Richard Steinmetz

Books On Demand Aug 2013, 2013. Taschenbuch. Book Condition: Neu. 211x149x2 mm. Neuware - In this dissertation, a multiscale dislocation density-based constitutive model for the strain-hardening behavior in twinning-induced plasticity(TWIP) steels is presented. The approach is a physics-based strain rate- and temperature-sensitive model which reflects microstructural investigations of twins and dislocation structures in TWIP steels. One distinct advantage of the approach is that the model parameters, some of which are derived by ab initio predictions, are physics-based and known within an order of magnitude. This allows more complex microstructural information to be included in the model without losing the ability to identify reasonable initial values and bounds for all parameters. Dislocation cells, grain size and twin volume fraction evolution are included. Particular attention is placed on the mechanism by which new deformation twins are nucleated, and a new formulation for the critical twinning stress ispresented. Various temperatures were included in the parameter optimization process. Dissipative heating is also considered. The use of physically justified parameters enables the identification of a universal parameter set for the example of an Fe 22wt%Mn 0.6wt%C TWIP steel. 200 pp. Englisch.

Reviews

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