L E C T U R E

A continuum model for initiation and evolution of deformation twinning

K.C. Le
Lehrstuhl für Allgemeine Mechanik, Ruhr-Universität Bochum
D-44780 Bochum, Germany

Abstract

Within continuum dislocation theory the plastic deformation of a single crystal with one active slip system under plane-strain constrained shear is investigated. By introducing a twinning shear into the energy of the crystal, we show that in a certain range of straining the formation of deformation twins becomes energetically preferable. An energetic threshold for the onset of twinning is determined. A rough analysis qualitatively describes not only the evolving volume fractions of twins but also their number during straining. Finally, we analyze the evolution of deformation twins and of the dislocation network at non-zero dissipation. We present the corresponding stress-strain hysteresis, the evolution of the plastic distortion, the twin volume fractions and the dislocation densities.

date: 22 October

time: 16 pm

place: lecture room 1102