

Structure, Energetics and Plasticity caused by Eshelby Dislocations

Christopher R. Weinberger

Sandia National Laboratories,
PO Box 5800, MS 1411,
Albuquerque, NM 87185, USA

Eshelby noted in 1953 that a screw dislocation lying along the axis of a rod is a metastable state in a crystal and provides a plastic twist. In this talk, his original development is extended to an arbitrary number of dislocations. The organization of these dislocations is similar in some respects to point charges on a disk. The energy of a distributions of these dislocations are computed as well as the plastic twist, providing an energy-twist relationship similar to grain boundaries. The torque-twist curves of wires whose plasticity is dominated by these dislocations is also simulated using discrete dislocation dynamics.