

Society of Engineering Science 51st Annual Technical Meeting

1–3 October 2014

Purdue University, West Lafayette, Indiana, USA

## Kinetics of a fast moving twinning dislocation

Daphalapurkar, Nitin, [nitin@jhu.edu](mailto:nitin@jhu.edu); Wilkerson, J.W.; Wright, T.W.; Ramesh, K.T., Johns Hopkins University, United States

### ABSTRACT

Constitutive models for plastic deformation in materials subjected to high rate loading conditions require kinetic descriptions of moving dislocations and moving interfaces. In materials that exhibit twinning, the velocities with which a twinning dislocation and a twin boundary can propagate has implications on the material behavior at high strain rates—specifically the rate of plastic deformation and the rate sensitivity. In this study, we focus our attention on motion of a twinning dislocation in a face-centered cubic nickel. We use molecular dynamics simulations to simulate a moving twinning dislocation and investigate the effects of changing shear stress. Results suggest the material speeds have an influence on the velocities with which a twinning dislocation can propagate. Velocities from simulations will be related to observations from impact experiments.