14th World Congress on Computational Mechanics (WCCM XIV)
8th European Congress on Computational Methods in Applied Science and Engineering (ECCOMAS 2020)
July 19- 24, 2020, Paris, France

A MULTI-SCALE PERSPECTIVE OF DISLOCATION MEDIATED CRYSTAL PLASTICITY

1100

YINAN CUI*, MINSHENG HUANG†

* Tsinghua University
School of Aerospace Engineering, Tsinghua University, Beijing 100084 China
cyn@mail.tsinghua.edu.cn

† Huazhong University of Science and Technology
Department of Mechanics, Huazhong University of Science and Technology, Wuhan, Hubei 430074 China mshuang@hust.edu.cn

Key words: Crystal plasticity, Dislocation, Multidimensional defects, Multiscale modelling.

ABSTRACT

Dislocation mediated crystal plasticity is an inherent multiscale process that ranges in length scale from the atomic scale of dislocation cores to the micrometer scale of dislocation substructures, and the intermediate mesoscopic scale of elastic interactions between different crystalline defects. The associated temporal scales range from fast events driven by dislocation glide and slower thermally-activated events like dislocation nucleation, cross-slip and climb, obstacle bypassing or solute drag. Considerable progress has been made over the past years toward an understanding of crystal plasticity from multiscale perspective. There is also an increased interest in revealing plastic mechanisms and developing the methods under multi-physics conditions. To highlight such achievements and facilitate meaningful exchange of ideas between experts engaged in this field, this symposium will focus on recent advances in dislocation-based modelling of plasticity, from the atomic to the continuum scale.

Topics of interest include the following:

1. Fundamental dislocation properties and behaviours
2. Discrete or continuous dislocation dynamics simulations
3. Interactions of dislocations with other defects (such as point defects and interfaces)
4. Multiscale bridging methods linking different scales in crystal plasticity.
5. Engineering application of crystal plasticity