סמינריון

הנך מוזמן/ת להרצאה סמינריונית של הפקולטה להנדסת מכונות **במסגרת הדוקטורט** שתתקיים ביום ה' 3.12.2020 (י"ז בכסלו, תשפ"א), בשעה 13:30 באמצעות הזום :

https://technion.zoom.us/j/91359043172

מרצה : אלון מלכה-מרקוביץ'

מנחה : פרופ'/ח דן מרדכי

על הנושא:

מידול מרובה סקאלות של החלקה צולבת בנקעים של גבישים יחידים בעלי מבנה ממורכז פאה

Multiscale Modelling of Dislocation Cross-Slip in Face Centered Cubic Metals

The seminar will be given in English

תקציר ההרצאה :

Plastic deformation is related to the evolution of lattice line defects, known as dislocations, and dislocation-based constitutive rules are a promising approach to have reliable models of plasticity. While most of the attention is paid to dislocation glide, dislocation cross-slip, which is a thermally-activated dislocation mechanism by which screw dislocations can change their glide plane, is poorly addressed. In particular, in face-centered cubic (FCC) metals, the cross-slip rate strongly depends on loading conditions and understanding the activation barrier for cross-slip in a general stress is essential to construct reliable cross-slip rules in constitutive models of FCC metals. This work provides a physically multiscale cross-slip model, which incorporates the general stress-field dependency, with an eye towards accurate models in mesoscopic simulation techniques. In this work a line-tension model was employed and a closed form analytical expression for the of the activation barrier for cross-slip was developed in a general stress field. We show that the results of the proposed model are in good agreement with previous computationally-demanding atomistic simulations. We then implemented the model as a probabilistic cross-slip rule in discrete dislocation dynamics (DDD) simulations, which bridge between the atomic and the continuum scales in modelling plastic deformation. This model allows, for the first time, to reproduce accurately probabilistic atomistic simulation results of cross-slip in DDD simulations. Finally, we examine in the DDD simulations the contribution of cross-slip to the strength of dislocation pile-ups, as an example to the collective effect of dislocations on cross-slip. This example demonstrates how the model can improve simulating phenomena such as deformation softening, dislocation-precipitate interaction, and dislocation patterning in DDD simulations.

בברכה,

שיוש'/ת אתי סאס

מרכז הסמינרים