

סמינריון

הנך מוזמן/ת להרצאה סמינריונית של הפקולטה להנדסת מכונות שתתקיים ביום ה' 7.11.2019
(ט' בחשוון, תש"פ), בניין דן קאהן, אודיטוריום 1, 13:45.

מרצה: שחר אפשטיין

מנחה: פרופ' ח דן מרדכי

על הנושא:

The Effective Mass of Partial Dislocations in Cu

The seminar will be given in Hebrew

תקציר ההרצאה:

Dislocations play an essential role in modeling plasticity from its basic building block, as it has been shown that their motion has a significant contribution to the plastic deformation in crystals. The earliest works by dislocations pioneers: Nabarro and Eshelby in the 1940s and 1950s, showed that dislocations might be treated as "elastic entities" with an effective mass, that obey certain rules of motion. Their works, as well as later publications by different researchers, tried to estimate the effective mass of perfect dislocations in different crystal structures. However, in FCC structures (such as Cu) - perfect dislocations are unstable and tend to dissociate into two partial dislocations, for which the effective mass in fully anisotropic media was yet to be found.

The main goal of this work is to estimate the effective mass of partial dislocations in anisotropic Cu crystal. Using molecular dynamics (MD) simulations, we simulated a dipole of two dislocations. Starting from a perfect dislocation, each dissociated into two partial dislocations on a {111} slip plane with an oscillating width in time (a phenomenon called "breathing"). Using the results of the MD simulations, we extracted the breathing frequency and the equilibrium dissociation width for various dipole sizes. In combination with dislocation elasticity theory (isotropic and anisotropic), we calibrated the effective mass and reproduced the simulation results.

The MD-validated anisotropic model for the calculation of the effective mass is an important step in a much greater effort to develop a continuum dislocation model and to obtain equations of motions for dislocation motions, which is key for dislocation-based models of plasticity.

בברכה,

שחר אפשטיין
מרכז הסמינרים