סמינריון

הנך מוזמן/ת להרצאה סמינריונית של הפקולטה להנדסת מכונות שתתקיים ביום ה׳ 07.01.2021

(כג׳ בטבת, תשפ״א), בשעה 14:30 באמצעות הזום:

https://technion.zoom.us/j/7041897110

מרצה: רומן קוסיצקי

מנחה: פרופ׳/ח דן מדרכי

על הנושא:

Multiscale Modeling of Shock-induced Plasticity in Body-Centered Cubic Metals

The seminar will be given in English

תקציר ההרצאה:

Plastic deformation of metals at high strain rates is of great importance in a variety of fields such as rapid machining and stamping, automobile and aerospace safety, and defense applications. Modeling plasticity in metals is traditionally considered on the continuum level, although it is well accepted that microstructural crystal defects on the atomic level are responsible for the macroscopic deformation. In this study, we developed a multiscale model for the dynamic strength of body-centered cubic (BCC) metals. Employing Molecular Dynamics (MD) simulations, we probe the microstructural mechanisms governing the plastic relaxation following a strong shock. With insights obtained from these simulations, we developed a continuum strength model that explicitly accounts for the evolution of dislocations during deformation. We found that a stress-driven dislocation nucleation term should be included in the dislocation evolution equations. The results from the continuum model are in good agreement with results from Split Hopkinson Pressure Bar experiments, plate impact and Richtmayer-Mechkov instabilities, and we were able to explain the temperature and strain rate dependencies of the dynamic strength in Ta and Va. Finally, I will present a MD simulation study that sheds light on the question of how much heat is produced during plastic deformation at high strain rates. Our simulations show that grain boundaries are the main source of heat storage/release.

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בברכה,

פרופ״ח מתי סוס

מרכז הסמינרים