Technion-Israel Institute of Technology
Faculty of Mechanical Engineering

הטכניון-מכון טכנולוגי לישראל
הפקולטה להנדסת מכונות

סמינריון

הנך מוזמן/ת להרצאה סמינריונית **במסגרת הדוקטורט**, של המכון לננוטכנולוגיה ע"ש ראסל ברי - RBNI שתתקיים ביום ה' 4.07.2019 (א' בתמוז, תשע"ט), בניין דן קאהן, אודיטוריום 1, 13:45.

מרצה: Mr. Juan Carlos Nieto Fuentes

מנחה: פרופ' דניאל ריטל

מנחה שותף: פרופ"מ שמוליק אוסובסקי

על הנושא:

Reconciling mechanical and thermomechanical dislocation-based constitutive models

The seminar will be given in English

תקציר ההרצאה :

Failure of metallic solids under dynamic (impact) loading conditions is a major concern in relation with several extreme engineering situations, such as ballistic impact, vehicle crash or metal forming. Under these conditions, material instabilities - triggered by the short time scales related to dynamic loading - may develop and inevitably precede fracture. During these transient events, and due to the thermo-mechanical coupling effect, part of the supplied mechanical work to plastically deform the material is dissipated as heat. As a consequence, a temperature rise (under near adiabatic conditions) is expected. The remaining, i.e., the non-dissipated work, is stored in the material in the form of microstructural defects (mainly dislocations), which is commonly known as the stored energy of cold work (SECW). The competition between the two, the temperature rise and the SECW, will determine the nature of the material failure. Certainly, the ratio of (adiabatic) thermo-mechanical (plastic work to heat) conversion, commonly known as the Taylor-Quinney factor (TQF), is of great importance when used, e.g., in fully-coupled analysis in numerical simulations.

Dislocations, as the main deformation mechanism present in FCC materials, are used in this work in the form of a continuum and physically-based model to predict the thermomechanical behavior of the material under dynamic conditions, giving an adequate estimation of the stress-strain relation and the TQF. The analytical prediction is compared with the results obtained from an extensive experimental campaign – by means of Kolsky tests and in situ infrared measurements - under high rates of deformation.

Keywords: Stored energy of cold work, high strain-rate, thermos-mechanical coupling.

בברכה,

פרופ"מ מתי' סאס

מרכז הסמינרים