הטכניון – מכון טכנולוגי לישראל
הפקולטה להנדסת מכונות

TECHNION – Israel Institute of Technology
Faculty of Mechanical Engineering

SEMINAR - סמינר

הנך מוזמן/ת להרצאה סמינריונית של הפקולטה להנדסת מכונות, שתתקיים ביום ב' 6.07.15 (יט' בתמוז, תשע"ה), בבניין דן-קאהן, קומה 0, אודיטוריום 1, שעה 14:30.

יצרה:

Michael Moshe
The Racah Institute of Physcics, The Hebrew University of Jerusalem

על הנושא:

The geometry and mechanics of growth and defects in amorphous materials

להלן תקציר ההרצאה:

In my talk I will address two main topics that are related to plastic deformations and growth of amorphous materials, in effectively 2D systems. I will use the geometric formalism of incompatible elasticity in order to describe these processes and solve for the stress states of the bodies.

In the first part of the talk I will present a new analytical method that allows the calculation of the equilibrium stress field in residually stressed bodies. The method, which is a generalization of the stress function approach, enables the calculation of the solution to the non-linear incompatible elastic problem. Using geometric compatibility conditions, the method provides exact equations for the "Incompatible Stress Function" (ISF) for arbitrary material's constitutive law. The relevant equations can be solved in a controlled level of linearization.

The second topic concerns the challenge of describing the intrinsic geometry of defects in amorphous materials. We argue that defects can be defined as local deviations of the material's reference metric field, from a Euclidian metric. This definition allows the description of intrinsic defects in amorphous, as well in crystalline materials, and allows for the formulation of the non-linear elastic problem. The reference metrics that describe isolated defects are obtained via multipole expansion of the reference Gaussian curvature field, leading to a hierarchy of defects. I will show the equivalence of the monopole and dipole cases to known defects in crystals. Finally, I will focus on the quadrupole terms that describe localized deformations, reminiscent of Eshelby inclusions, and on the way in which an ensemble of defects is described in the formalism.

Application of the ISF method to cases of bodies that contain defects (as defined earlier) allows the derivation of quantitative expressions for the interaction energies of any kind of defects with each other and with external fields.

I will demonstrate the relevance of thes presented results to the development of geometrical modeling of plasticity in amorphous materials, for defective thin sheets, for contracting cells attached to elastic substrates, and for elastic meta-materials.

המארח: פרופ'/מ ספי גבלי

בברכה,

פרופ'/א אמיר שמ
מרכז הסמינרים