סמינריון

הנך מוזמן/ת להרצאה סמינריונית של הפקולטה להנדסת מכונות, שתתקיים ביום ב' 31.10.16 (כ"ט בתשרי, תשע"ז), בבניין דן-קאהן, קומה 0, אודיטוריום 1, 14:30.

יצרה: לאון גורליק

מנחה: פרופ"מ דן מרדכי

על הנושא:

Mechanical Properties of Hollow and Coated Rigid Cylinders at the Nanoscale

The seminar will be given in Hebrew

להלן תקציר ההרצאה:

Understanding the mechanical properties of contacts at the nanoscale is a key to controlling the strength of coated surfaces. Despite its importance, quantifying the plastic yield of coated surfaces at the nanometer scale under load remains a big challenge. Mechanical properties of specimens at the nanoscale are different from their bulk counterparts, e.g., strength may be substantially higher, size and shape dependent. Therefore, to study the plastic yield at the nanoscale one should consider the atomic structure of the coated surfaces, which is beyond most of the current computational capabilities. In this work, we solve a simplified problem in order to explore to which extent existing continuum models describing contacts can be extended to the nanoscale. Molecular dynamics simulations of hollow cylinders or coated rigid cylinders under diametrical compression were performed and compared with models at the continuum level. We show here that the geometry of the atomic scale contact is essential to capture the contact stiffness, especially at high relative thicknesses for hollow cylinders and for cylindrical coatings. The contact pressure profiles in atomic-scale contacts were found to be substantially different than the one proposed in the continuum models for rounded contacts. On the basis of these results, we formulated analytical models for the contact stiffness and we show how to bridge between the atomic and continuum scales with atomically-informed geometry of the contact. Finally, we discuss the predictability of continuum-based models to identify the onset of plasticity based on a resolved shear stress criterion and their limitations in predicting the strength.

בברכה,

שרון אמיר

מרכז הסמינרים