SEMINAR - סמינר

הנך מוזמן/ת להרצאה סמינריונית של הפקולטה להנדסת מכונות, שתתקיים ביום ב׳ 14.03.2022 (י״א באדר ב׳ תשפ״ב), בשעה 14:30 באמצעות הזום :
https://technion.zoom.us/j/91281131652

מרצה: **Dr. Eyass Massarwa**
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על הנושא:

Multiscale Analyses of Composites Subjected to Quasi-static and High Strain-rate Loading Conditions

The seminar will be given in English

להלן תקציר ההרצאה:

This study has two main objectives. The first is to develop a multiscale computational framework to analyze fiber-reinforced composites subjected to quasi-static loading condition by integrating the parametric High-Fidelity Generalized Method of Cells (HFGMC) micromechanics and failure criteria with a finite-element (FE) explicit procedure. The three-dimensional hexagonal array representative unit-cell (RUC) of fiber-reinforced composites is used. The RUC is discretized into several sub-cells to explicitly represent the fiber and matrix constituents of the composite at the micro-level. The fiber is considered to behave as an elastic transversely isotropic material, while the J2-deformation plasticity is used to account for the matrix nonlinearity. The strain invariant failure theory of composites is used. A user-defined material subroutine is written and called in the FE procedure through the Gaussian points of solid/shell elements to analyze macroscale composite structures. Damage analyses for notched fiber-reinforced polymer structures are performed. Biaxial failure envelopes are generated and compared to experimental data. The second objective is to develop FE model for porous metallic material under high-strain rate loading condition to investigate the effects of the microstructure on the plastic shock wave, and to identify the collapse mechanisms. Porous media containing spherical and oblate ellipsoidal voids are considered. Cylindrical representative volume elements (RVEs) of porous microstructures are generated. An axisymmetric FE model of cylindrical porous medium consisting of an array of identical repeating RVEs impacted by a rigid body is developed. The behavior of the metallic material is defined using the Cowper-Symonds model and the Mie-Grüneisen equation of state. Shock analyses for porous aluminum with different levels of porosity are performed and compared to experimental data. A parametric study is performed to investigate the influence of the porosity, shape, and size of voids on the shock wave.

This study reflects the need to develop additional robust validated computational tools for predicting the mechanical performance of complex multiphase materials under both mechanical and environmental conditions, using state-of-the-art technology. This need motivates us to continue working on the current study.

מארח : פרופ׳ מיכאל שפירא

בברכה,

פרופ״ח אתי סאס
מרכז הסמינרים