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 הפקולטה להנדסת מכונות,
שתתקיים ביום ב' 18.09.17 (כז' באלול, תשע"ז), בניין דן-קאהן, אודיטוריום 1 , 14:30.

מרצה: אורי חיימוביץ'

מנחה: פרופ' סטיבן פרנקל

על הנושא:

Numerical simulations of compressible multicomponent and mulitphase flow using a high-order Targeted ENO (TENO) finite-volume method

The seminar will be given in English

להלן תקציר ההרצאה:

Multicomponent and multiphase compressible flows are widely found in science and engineering such as astrophysics, combustion, explosions, detonations, nuclear reactors, and underwater projectiles. These flows involve highly distorted interfaces and often feature interactions between shock waves and bubbles related to cavitation. The challenge in high-fidelity numerical simulation of such flows is to accurately resolve small scale features while simultaneously providing targeted dissipation to avoid spurious oscillations associated with capturing shocks and sharp interfaces

In this research, we have developed and applied a new high-order finite-volume code to numerically solve the inviscid six equation formulation for multicomponent and multiphase flow using a combination of Gauss-Legendre quadrature, the recently published targeted ENO scheme for spatial reconstruction of primitive variables, the modified HLLC approximate Riemann solver suitable, and a third-order TVD Runge-Kutta for explicit time advancement.

Results using a fifth-order version of the scheme are presented from a number of benchmark problems, including the 1D cavitation and water-air shock tube problem, 2D shock-bubble interaction problems featuring both the Kelvin-Helmholtz and Richtmeyer-Meshkov instabilities with qualitative comparison to experimental Schlieren and a comparative study of various WENO reconstruction schemes.

The interaction of a planar shock wave with a three-dimensional cube-shaped sulphur hexafluoride, SF6, bubble is also numerically studied. We study and quantify the contribution of baroclinic, dilatation and stretching vorticity components on the flow dynamics. We also observe the phenomena of axis switching of the bubble along time.

בברכה,

פרופ"א שאול אוסובסקי
מרכז הסמינרים