SEMINAR - סמינר

הנך מוזמן/ת להרצאה סמינריונית של הפקולטה להנדסת מכונות, שתתקיים ביום ה' 16.01.2020
(י"ט בטבת תש"פ), בניין דן קאהן, אודיטוריום 1, 15:30.

מרצה:

Dr. Yoram Kozak

Department of Aerospace Engineering
Texas A&M University, College Station, TX, USA

על הנושא:

Fast and Highly Compressible Single- and Multi-Phase Reacting Flows

The seminar will be given in English

להלן תקציר ההרצאה:

High flow speeds and significant compressibility levels can be found in a wide range of single- and multi-phase reacting flows. These include various propulsion and energy conversion systems, such as scramjet and detonation engines, industrial explosions, and different military applications. Better understanding of these extreme flow regimes is possible either by experimentation or numerical modeling. The latter requires the development of novel modeling approaches capable of providing high accuracy in these extreme regimes characterized by large spatial and temporal variability. In this talk, several unique numerical and experimental difficulties, each associated with a different flow configuration of interest, will be discussed. First, the limitations of the classical Eulerian-Lagrangian formulation for multi-phase flow modeling under highly compressible conditions will be presented. It is demonstrated that for highly compressible flows, typical interpolation methods fail and a Weighted-Essentially-Non-Oscillatory (WENO) interpolation can provide a superior alternative. This new formulation is then utilized to critically assess the accuracy of the classical Particle Image Velocimetry (PIV) technique for flow characterization in gas-phase detonations and high-speed turbulence. Also, newly developed numerical techniques and models for liquid spray and solid particle combustion will be discussed. Then, the dynamics of highly compressible, fast, turbulent flames capable of undergoing a transition to a detonation wave are studied using Direct Numerical Simulations (DNS) based on realistic experimental conditions. The results raise questions regarding the ability of the classical RANS and LES techniques to model properly the complex physics associated with these inherently unstable fast turbulent reacting flows. Finally, future research directions in the context of the problems discussed above will be presented.

Bio: Dr. Yoram Kozak is a Postdoctoral Research Associate at the Department of Aerospace Engineering of Texas A&M University since 2017. He earned his BSc (2010), MSc (2012) and PhD (2016) degrees from the Department of Mechanical Engineering at Ben-Gurion University of the Negev in Beer-Sheva. His research interests include: Modeling of single- and multi-phase combustion processes; high-performance parallel computing including Direct Numerical Simulations (DNS); development of new numerical methods and Computational Fluid Dynamics (CFD) algorithms.

מארח : פרופ' אולג גנדלמן

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