

סמינריון

הנך מוזמן/ת להרצאה סמינריונית של הפקולטה להנדסת מכונות שתתקיים ביום ד' 01.12.21
(כ"ז בכסלו תשפ"ב), בשעה 13:30 באמצעות הזום:

<https://technion.zoom.us/j/96116261667>

מרצה: עמרי ארגוב

מנחה: פרופ' סטיב פרנקל

על הנושא:

Numerical Modeling of Atomization in High-Speed Multi-Phase Flows

The seminar will be given in English

תקציר ההרצאה:

With renewed interest in hypersonic propulsion systems such as scramjets in recent years, the field of compressible multi-phase flow is under intensive development. A key aspect of compressible multi-phase flow is liquid fuel injection, mixing, and atomization in the presence of a supersonic crossflow e.g. in a scramjet combustor. This phenomenon directly impacts the design of efficient and stable scramjets with an eye towards reliable ignition in complex transient startup conditions. The conditions within the scramjet's combustor are challenging to replicate experimentally, making numerical modelling of the complex flow conditions experienced during engine startup and hypersonic flight important. Numerical simulations of the atomization process can provide deeper insight into the physical mechanisms of atomization and the impact of flow parameters on droplet breakup. However, numerical methods incorporating surface tension effects have been in limited use.

In this work, two state-of-the-art numerical methods for modelling atomization in compressible flows are studied: MUSCL-THINC-BVD with capillary and viscous forces and ρ -THINC. MUSCL-THINC-BVD yields correct results in one-dimensional two-phase flow. However, it fails to predict the atomization process correctly. In contrast, ρ -THINC accurately computes the atomization process and successfully predicts the atomized droplet shape in comparison to experiments.

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