סמינריון

הנך מוזמן/ת להרצאה סמינריונית של הפקולטה להנדסת מכונות שתתקיים ביום ד' 17.04.2019

(י"ב בניסן, תשע"ט), בניין דן קאהן, חדר 217, 13:30.

מרצה: יגאל צרפיס

מנחה: פרופ' סטיבן פרנקל

על הנושא:

הערכת שיטות שפה שקועה עבור סימולציות ערבולים גדולים של זרימות תרמו-הידראוליות טורבולנטיות

Assessment of immersed boundary methods for large eddy simulations of thermal-hydraulic turbulent flows

The seminar will be given in English

תקציר ההרצאה:

Many physical phenomena in real world could be classified as thermal-hydraulic flows, some of which belong to the atmospheric, environmental, cooling systems, internal combustion processes, and high speed vessels fields. Thermo-hydraulic internal flow is a common physical phenomena in many industrial applications, such as cooling piping, mixing tanks, and internal combustion engines. It is characterized with velocity and temperature turbulent field patterns. As resolving internal flows often concerns dealing with complex geometrical features, this thesis deals with assessing a non-conformal meshing strategies, namely the immersed boundary method. Though this method is not new, and was shown to have value for multiphase, multibody flows, still special care must be taken when this is to be applied to a thermal flow.

To this end two academic codes where closely examined: the in-house wenoCFD solver that uses the weighted essentially non oscillatory high-order finite-differences scheme for incompressible Navier-Stokes large eddie simulation. It is based on a novel multi-block immersed boundary method that is capable of high-fidelity within complex geometries. The solver is message passing interface integrated for parallel execution. And the Incompact3D solver that uses 6th order compact schemes for large eddie simulation and is highly scalable. It has a general geometry immersed boundary method for the incompressible Navier-Stokes and passive scalar formulations. Each of the solvers facilitates a different immersed boundary method approach.

The assessment and suitability of such approach to the flows at hand was showcased on case setups as jet in a cross flow, flow in a rectangular and circular T-junction (Vattenfall experiment), and flow over a tube bundle (MATIS-H experiment). Going forward from a common basic case, moving to a simple geometry - complex flow pattern cases to a complex geometry setup, results were compared with high quality experimental data, to a satisfactory level. Several insights, such as proper inlet, outlet, and adiabatic boundary conditions, were gained during the work process, which could potentially improve and facilitate an industry level immersed boundary method code for thermal-hydraulic flows.

בברכה,

פרופ"מ מתי סאס

מרכז הסמינרים