**INTERNSHIP POSITION**

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| **Topic**  | Numerical and analytical computations in supersonic flows |
| **Specification/****Programme**(min. 100 words) | Majority of problems in computational fluid dynamics (CFD) is solved as the incompressible flow. However, when the flow is compressible, its density changes and needs to be solved along with other equations of fluid flow. When the changes in density are significant, the speed of an object or fluid flowing over it may exceed the speed of sound. Such cases are usually denoted as supersonic flows. The immense progress in the field of computer science in last decades enables to solve such flows quite efficiently. The ideal gas law will be used in all cases. Although CFD is a valuable tool for solving compressible flows, it is still not perfect and engineers cannot rely only on it itself. Therefore, it is always a good habit to validate CFD results with experiments or analytical solutions. The main objectives of this project is familiarization with the basic problems in compressible and supersonic flows. The student will prepare materials for 2–3 supersonic cases (external or internal) solved both numerically and analytically. Comparisons with an analytical approach would be beneficial but not obligatory. CFD can be done either in a commercial or non-commercial software package. Furthermore, all cases should be thoroughly verified for correctness, so, for example, problems solved as two-dimensional should be compared to their corresponding three-dimensional geometries. Additionally, problems should be solved both, in a steady and transient manner. The aim of this project is to prepare study materials which would help students with a deeper understanding of supersonic flows and facilitate comparisons of CFD results with results obtained from an analytical approach.**Aimed at Bachelor's or Master's students.** |
| **Time period** | Apr. 2024 to May 2024 or Oct. 2024 to Nov. 2024 |
| **Length of the traineeship - number of months** | 1 - 2 months |
| **Supervisor´s name and contact**  | Jan Kracik Technical University of LiberecFaculty of Mechanical EngineeringDepartment of Power Engineering EquipmentStudentská 1402/246117 Liberecjan.kracik@tul.cz |
| **Administrative Contact** | Marcela Valkova, marcela.valkova@tul.cz  |
| **Documents required** | CV, Letter of motivation, Transcript of Records |