Open Positions

Positions are available for MSc and PhD students in theoretical fluid mechanics, in one of the following areas:

1. **Aeroacoustics**: Aeroacoustics is a branch in unsteady aerodynamics dealing with the conversion of hydrodynamic kinetic energy into sound waves and their propagation to the far field. Almost every aeronautical application generates sound, including flows over airfoils, turbulence in combustion chambers, jet emission from aircraft engines, etc. When modeling aeroacoustic phenomena, particular care should be taken to describe the sources of sound and apply appropriate acoustic analogies to evaluate the far-field radiation. Proposed research topics include investigation of the coupling between aeroelastic and aeroacoustic phenomena, common in biological (insect and bird flight) and industrial (micro-air-vehicle flight) applications; examination of acoustic analogies for the prediction of small-scale flight noise; and development of noise control methodologies for practical applications. The research incorporates theoretical and numerical aspects.

2. **Rarefied and small-scale gas dynamics**: Gas flowing in micro-scale devices or at extreme low pressures is named "rarefied". Quantitatively, when the typical length-scale of a gas-flow problem becomes of the order of the mean free path of a gas molecule, the continuum hypothesis breaks down and the flow-field cannot be described using traditional continuum (Navier-Stokes) equations. This situation is common in high-altitude flight (during reentry of space shuttles), where the mean free path is large, or in small-scale electronic devices (MEMS/NEMS), where both length- and time-scales can be very small. In such cases any study of "classical" phenomena, such as hydrodynamic stability or heat and mass transfer, must take into account the microscopic (molecular) properties of the fluid. The proposed research examines the conditions for continuum breakdown and applies the kinetic theory of gases to study problems such as high-altitude flight; ultra-fast heating processes; and transition to turbulence in rarefied gas flows.

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