

VON KARMAN INSTITUTE FOR FLUID DYNAMICS INPA INSTITUT VON KARMAN DE DYNAMIQUE DES FLUIDES AISBL VON KARMAN INSTITUUT VOOR STROMINGSDYNAMICA IVZW

February-June 2013 Stage Offer

The von Karman Institute (VKI) is a non-profit international educational and scientific organisation active in the domain of Aerospace, Turbomachinery and Environmental and Applied Fluid Dynamics. Its labs are using equipments of all types, from dedicated experimental instruments to High Performance Computing Clusters.

The working environment is an international one, with students and researchers coming from different world countries. The institute is located in the outskirts of Brussels and easily reachable by bike or public transport.

Development of an in-situ adaptive tabulation module for the Mutation++ library

In-situ adaptive tabulation (ISAT) is a method developed in the late 90's of dynamically building a linear approximation to complex functions in an N-dimensional space. Its usefulness has already been proven for finite rate chemistry applications by reducing total computational workload for large 3D CFD simulations by up to 3 orders of magnitude. During this project, a student will design and implement a module in Mutation++ that will provide generic ISAT capability and apply it to the finite-rate chemistry calculations already implemented in the library.

If time permits, alternative uses for ISAT will be explored such as chemical equilibrium, or radiation computations.

Working Environment

The VKI will provide the support needed for the understanding of the underlying theory and algorithmic approach via a couple of PhD students actively working on the library. As far as the technical part is concerned, other PhD students can offer support and guidance on correct coding guidelines and speeding techniques. The students will be followed actively and constantly. English spoken and written knowledge is a plus.

Prerequisites

The student should be comfortable with C++ and have experience working in a Unix environment. Experience with code profiling and optimization as well as knowledge of linear algebra and numerical analysis is required.

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