Turbomachinery and propulsion Department
Von Karman Institute

PhD Student in Efficient Uncertainty quantification For Optimization in Robust design of Industrial Applications (EUFORIA)
(Full-time, fixed term for four years, available from 1 August 2015)

Important: To apply for this offer, please send a resume, motivation letter and two reference letters. Incomplete applications will not be regarded.

This new research position is being funded through the Flemish IWT-SBO scheme. You will work within the turbomachinery department of the Von Karman Institute (Belgium). You will be a member of a multidisciplinary consortium (with Stanford University, UGent, KU Leuven and VUB) working on an exciting new project aiming to develop efficient optimization algorithms for robust design optimization problems.

You will have a 1st or upper second class (or equivalent) undergraduate degree in Engineering, Mathematics or a Physical Science. Research experience gained through an MSc or other higher degree would be advantageous. Excellent interpersonal and communication skills are essential, as is a willingness to work flexibly and travel for conferences. It is expected that the successful applicant would register for a PhD degree at a University of choice.
You will also be a European passport holder with permission to work in Belgium.

Informal enquires to Tom Verstraete, tom.verstraete@vki.ac.be Please send a resume, a motivation letter and 2 reference letters.

Closing Date: 1st July 2015

Turbomachinery and propulsion Department

Von Karman Institute

Hours of work: Full Time

Responsible to: Tom Verstraete

Reports to: Tom Verstraete

Job Summary

This new research position is being funded by the flemish region IWT-SBO. You will work in the Von Karman Institue, Belgium.

Background Information

You will be based in the turbomachinery and propulsion department of the von Karman Institute, which priveleges a world-wide recognision in the research and training on turbomachinery. The Turbomachinery and Propulsion department specializes in the aero-thermal aspects of turbomachinery components for aero-engines and industrial gas turbines, space propulsion units, steam turbines and process industry compressors and pumps. It has accumulated skills in wind tunnel testing over a wide range of Mach and Reynolds numbers and related measurement techniques development and application.
The department has acquired a world recognised expertise on steady/unsteady aerodynamic and aero/thermal aspects of high pressure, including cooling, and low pressure turbomachinery components through the design, development and use of a number of unique wind tunnels.
The department has over 20 years of experience in the computational analysis of flow in turbomachines, and in the design techniques and multi-disciplinary optimization methods of their components.

Project Description

Lead Organisation: Von Karman Institute

Purpose:

Uncertainty quantification is a growing field within the engineering sciences. It has been identified by industry as an important instrument to improve their product quality at the

design stage. However, still many different problems are to be addressed before routinely use of uncertainty quantification and robust optimization can be realized.
Within this PhD, the successful candidate will focus on metamodel assisted techniques for uncertainty quantification as well as on improving optimization methods to work under uncertainties. Several important studies and improvements to existing metamodeling techniques are to be expected to enable routinely use in industry. Therefore the candidate will develop and improve Kriging metamodeling techniques that include gradient information. Additionally, the candidate has to look into multi surrogate approximation and dynamic infill criteria. Finally, the developed enhancements in the metamodelling need to go hand in hand with implementations on the optimization framework to allow for efficient global optimization.

Networking and Training: You will benefit from expertise in Multi-disciplinary Design Optimization and High Performance Computing, Turbomachinery and high fidelity CFD in VKI. In addition, strong collaboration with other researchers from the EUFORIA consortium is expected to expose you to other research disciplines and aspects relevant to the project. You will have the opportunity to obtain high level training in a number of complementary skills, providing you with a solid framework in which you will be able to develop the rest of your career, being that in academia or industry.

Main Duties and Responsibilities

Your research will involve working closely with other researchers within EUFORIA. In particular you will:

- Work independently on the designated project within EUFORIA.
- Develop and improve an efficient optimization framework for robust design optimization.
- Validate the code performance on numerous test cases and architectures.
- Deliver prescribed project objectives on time and within budget.
- Collaborate with other researchers in EUFORIA and within the VKI to build sustainable parternships of mutual benefit and aid the process of dissemination.
- Communicate and provide information to academic and industrial supervisors including the regular attendance at formal supervisory meetings.
- Attend and prepare reports for regular meetings with other members of the grant team, to report progress, agree future work and exchange data/experience.
- Manage aspects of the project and co-ordinate work with other internal and external collaborators.
- Independently identify additional external and internal resources to effectively deliver the project work.

- Ensure good progress is maintained and work is undertaken in a systematic way that is well documented so that data can be shared across the project group.
- Train undergraduate and taught MSc students in areas of similar activity and skills and co-supervise projects in this area.
- Prepare written papers and presentations to disseminate the research findings to both EUFORIA partners, the academic and industrial communities and to the wider public at both national and international level.
- Work effectively and positively as required as a team player on a broad range of activities and related projects within the wider research groupings to help achieve the broader strategic development.
- Participate in public engagement activities.
- Identify other research project opportunities and directions as they arise.
- Uphold and enhance the internationally excellent reputation of the organisations you will be associated with and the independent network of contacts by building collaborations with other academics and external stakeholders.
- Work within and apply the standard operating procedures, health and safety regulations and quality assurance procedures of both the VKI and when on secondment at the project partners and be responsible for the health and safety management of relevant projects and research work.

Person Specification		**Essential / Desirable**
1.	A 1st or upper second class degree (or equivalent) in Engineering, Mathematics or a Physical Science.	**Essential**
2.	Hands-on experience of high fidelity RANS based CFD simulation for turbomachinery problems.	**Disirable**
3.	Experience of working in a research environment within an academic or industrial setting.	**Essential**
4.	Evidence of having developed independent research skills including experience of project management.	**Essential**
5.	Demonstrate the ability to work as part of a multidisciplinary team.	**Essential**
6.	Evidence of the ability to document and organise work effectively.	**Essential**
7.	Excellent interpersonal and communication skills with command of the English language.	**Essential**
8.	Willingness to work flexibly, where necessary, to fulfil the needs of the research project, including travel within the UK and internationally.	**Essential**
9.	A strong MSc degree from Engineering or Physical Sciences	**Desirable**

10.	Knowledge and experience of turbomachinery.	**Essential**
11.	Experience with C++ programming	**Essential**
12.	Can do approach to problem solving and issue resolution.	**Desirable**
13.	Collaborative approach to work and development of a supportive culture.	**Desirable**
14.	Have published in either peer-review journals or conferences.	**Desirable**

Key Working Relationships

On a day to day basis the researcher will be responsible to Tom Verstraete..

Additional information

Details of the terms and conditions of employment at the von Karman Institute, including information on pensions and benefits, are available on request.

A Criminal Records Disclosure is not required for this position however applicants who have **unspent** convictions must indicate this in their application and must declare the nature of the conviction.

Data Protection

The information you provide in your application will be used to consider your suitability for the post for which you have applied. If your application is not successful the information will be disposed of confidentially after 9 months.