2018-00394 - PhD Position / Scientific computing / Numerical schemes and simulations / Virtual Prototyping of the EVE expandER (VIPER Project)

**Contract type:** Public service fixed-term contract  
**Level of qualifications required:** Graduate degree or equivalent  
**Fonction:** PhD Position  
**Level of experience:** Recently graduated

**Context**
Within the framework of a partnership:
- project VIPER with the EXOES company  
- public partnership with the Conseil Régional d'Aquitaine

**Assignment**

**Assignments:**
The main objective of this thesis is the construction of a numerical platform, for permitting an efficient virtual prototyping of the EVE expander. This will provide the EXOES Company with a numerical tool, that is much more predictive with respect to the tools currently available and used in EXOES, by respecting an optimal trade-off in terms of complexity/cost needed during an industrial design process.

**Collaboration:**
The recruited person will be in connection with Héloïse Beaugendre (CARDAMOM Team) and Pietro Congedo (DEFI Team)

**Main activities**
Two research axes will be mainly developed. First, the objective is to perform some high-predictive numerical simulation for reducing the amount of experiments, thanks to a specific development of RANS tools (Reynolds Averaged Navier-Stokes equations) for the fluids of interest for EXOES. These tools would rely on complex thermodynamic models and a turbulence model that should be modified. These modifications will be realized by calibrating the turbulence model with respect to some high-fidelity simulations as for example Direct Numerical Simulations or Large Eddy simulations, provided by Prof. A. Giauque and Prof. C. Corre in the context of a strong collaboration between INRIA and LFMA Lab (http://www.ec-lyon.fr/en/research/laboratories/lmfa). Another action will be devoted to the formulation of low-fidelity models, i.e. models providing a low-cost estimation of the system performances. This is of prominent importance in order to control the global cost, considering that running several unsteady RANS simulations could be very expensive.

The second axis is focused on the integration of the solvers of different fidelity in a multi-fidelity platform for performing optimization under uncertainties. The idea is to evaluate the system performances by using massively the low-fidelity models, and by correcting these estimations via only few calculations with the high-fidelity code. In order to improve the predictive character of the simulation, the effect of each source of uncertainty, both on the physical modeling and the experimental data will be taken into account, by integrating every element within a robust optimization loop. In this way, EXOES could exploit a general tool for a fast and efficient design, by adapting the strategy according to the specific constraints required from the customers in terms of design and technological constraints.

**Benefits package**
- Subsidised catering service  
- Partially-reimbursed public transport  
- Social security

**General Information**
- **Theme/Domain:** Numerical schemes and simulations  
- **Scientific computing (BAP E)**  
- **Town/city:** Talence  
- **Inria Center:** CRI Bordeaux - Sud-Ouest  
- **Starting date:** 2018-05-01  
- **Duration of contract:** 3 years  
- **Deadline to apply:** 2018-05-31

**Contacts**
- **Inria Team:** CARDAMOM  
- **Recruiter:**  
  Beaugendre Héloïse / heloise.beaugendre@inria.fr

**The keys to success**
Candidates are required to have a Master's degree in engineering, applied mathematics or a related discipline, and a specialization in computational fluid dynamics. Preferable qualifications for candidates include proven research talent, an excellent command of English, and good academic writing and presentation skills.

Applicants should submit a Curriculum Vitae, a covering letter as a single document detailing the knowledge, skills and experience you think make you the right candidate for the thesis, two letters of reference, a list of your MSc courses and grades, copy of your Master's thesis and preferably a list of publications.

**About Inria**
Inria, the French National Institute for computer science and applied mathematics, promotes "scientific excellence for technology transfer and society". Graduates from the world's top universities, Inria's 2,700 employees rise to the challenges of digital sciences. With its open, agile model, Inria is able to explore original approaches with its partners in industry and academia and provide an efficient response to the multidisciplinary and application challenges of the digital transformation. Inria is the source of many innovations that add value and create jobs.

**Conditions for application**
Thank you to send:
- updated CV  
- cover letter  
- letters of recommendation  
- Master Degree Transcripts (please include your "Transcripts" document with your cover letter or with the letters of recommendation)

**Defence Security:**
Paid leave

Remuneration
Fix term contract
Duration: 36 months
Gross Salary: 1982€ / month (before taxes) during the first 2 years, 2085€ / month (before taxes) during the third year

This position is likely to be situated in a restricted area (ZRR), as defined in Decree No. 2011-1425 relating to the protection of national scientific and technical potential (PPST). Authorisation to enter an area is granted by the director of the unit, following a favourable Ministerial decision, as defined in the decree of 3 July 2012 relating to the PPST. An unfavourable Ministerial decision in respect of a position situated in a ZRR would result in the cancellation of the appointment.

Recruitment Policy:
As part of its diversity policy, all Inria positions are accessible to people with disabilities.

Warning: you must enter your e-mail address in order to save your application to Inria. Applications must be submitted online on the Inria website. Processing of applications sent from other channels is not guaranteed.