



**Offer #2023-06079**

## **Post-Doctoral Research Visit F/M High Performance Solver for Aeroacoustics**

**Contract type :** Fixed-term contract

**Level of qualifications required :** PhD or equivalent

**Fonction :** Post-Doctoral Research Visit

**Level of experience :** Recently graduated

### **About the research centre or Inria department**

The Inria center at the University of Bordeaux is one of the nine Inria centers in France and has about twenty research teams.. The Inria centre is a major and recognized player in the field of digital sciences. It is at the heart of a rich R&D and innovation ecosystem: highly innovative SMEs, large industrial groups, competitiveness clusters, research and higher education players, laboratories of excellence, technological research institute...

### **Context**

Within the framework of the MAMBO project financed by the DGAC (French Civil Aviation Administration), Inria is recruiting a post-doctoral researcher within the CONCACE team for a period of 2 years at the Inria center at the University of Bordeaux. The objective is to continue and industrialize work from a previous PhD on the high performance solution of linear systems from aero-acoustics. As the CONCACE team is shared between Inria, Cerfacs (Toulouse) and Airbus Central R&T (Issy-Les-Moulineaux and Toulouse), travel will be possible between these sites (travel expenses will be covered within the limits of the current scale).

### **Assignment**

In the prolongation of Marek Felsoci's thesis, the candidate will be led to resume and extend this work devoted to the efficient solution of linear systems with dense and sparse parts. For dense linear systems, the most efficient approaches are based on hierarchical matrices (H-matrices <https://www.theses.fr/2014PA132030> ) with low rank compression. For sparse linear systems, approaches based on nested dissection are used instead. The goal of this post-doc is to test two promising approaches:

- either use H-matrices for the whole dense+sparse system, using nested dissection on the sparse part ;
- or mix two different softwares (h-mat and qrm [https://gitlab.com/qm\\_mumps/qm\\_mumps](https://gitlab.com/qm_mumps/qm_mumps) ) to treat the dense and sparse parts.

In all cases, task-based parallelism will be used via the StarPU runtime engine (<https://starpu.gitlabpages.inria.fr/>). The subject will be done in collaboration with the Airbus acoustics teams to validate the approaches on industrial cases.

### **Main activities**

Main activities :

- Bibliography and understanding of existing algorithms;
- Programming, testing, validation of new methods;
- Realization of industrial tests and scaling up in parallel;
- Writing documentation, scientific reports, research articles;
- Presentation in the framework of the MAMBO project and in scientific conferences.

Additional activities :

(if desired) teaching and managing interns

### **Skills**

Technical skills and level required: 5 years or more of higher education or equivalent, master or

engineering degree or PhD in applied mathematics or computer science with a scientific computing component.

Languages: the working language will be mainly French, but English will be used in exchanges with non-French speaking team members or collaborators.

Interpersonal skills: enjoy working and interacting in a collaborative research environment, curiosity and creativity.

Additional skills: writing scientific papers and public presentations of results.

## Benefits package

- Subsidized meals
- Partial reimbursement of public transport costs
- Leave: 7 weeks of annual leave + 10 extra days off due to RTT (statutory reduction in working hours) + possibility of exceptional leave (sick children, moving home, etc.)
- Possibility of partial teleworking and flexible organization of working hours
- Professional equipment available (videoconferencing, loan of computer equipment, etc.)
- Social, cultural and sports events and activities

## Remuneration

Fixed-term contract, gross monthly remuneration (before taxes and monthly income tax deduction): 2746 euros

## General Information

- **Theme/Domain** : Distributed and High Performance Computing  
Scientific computing (BAP E)
- **Town/city** : Talence
- **Inria Center** : [Centre Inria de l'université de Bordeaux](#)
- **Starting date** : 2023-10-01
- **Duration of contract** : 2 years
- **Deadline to apply** : 2024-06-30

## Contacts

- **Inria Team** : [CONCACE](#)
- **Recruiter** :  
Sylvand Guillaume / [Guillaume.Sylvand@inria.fr](mailto:Guillaume.Sylvand@inria.fr)

## About Inria

Inria is the French national research institute dedicated to digital science and technology. It employs 2,600 people. Its 200 agile project teams, generally run jointly with academic partners, include more than 3,500 scientists and engineers working to meet the challenges of digital technology, often at the interface with other disciplines. The Institute also employs numerous talents in over forty different professions. 900 research support staff contribute to the preparation and development of scientific and entrepreneurial projects that have a worldwide impact.

## The keys to success

The candidate should be interested in programming in general (C, C++, fortran, compilation, scripting, python), and digital sciences and high performance computing in particular. Teamwork, both locally and remotely, will be part of the daily routine of this job.

**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.

## Instruction to apply

We thank you for applying through your candidate area by submitting the following documents:

- CV with list of publications
- letter of motivation
- letters of recommendation

### Defence Security :

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.