Offer #2023-06298

Post-Doctoral Research Visit F/M Non-local conservation laws for engineering and life-science applications

Contract type : Fixed-term contract

Level of qualifications required : PhD or equivalent

Fonction : Post-Doctoral Research Visit

Level of experience : Recently graduated

Context

Every year Inria International Relations Department has a few postdoctoral positions**in order to support Inria international collaborations**.

This year, postdoctoral positions within the frame of**Inria London, Inria Brasil and Inria Chile** programs and to strengthen partnerships with **Simula (Norway), University of Waterloo (Canada) and KAIST and ETRI (South Korea)** are eligible.

The postdoc contract will have a duration of**12 to 24 months**. The default start date is November 1st, 2023 and not later than January, 1st 2024. In the frame of **Inria Chile** program, the postdoctoral fellow will be recruited by the **Inria Centre of Université Côte d'Azur** (ACUMES Project-Team) in France but the time is shared between France and Chile (Universities of Concepcion and Bio-Bio) (please note that the postdoctoral fellow has to start his/her contract being in France and that the visits have to respect Inria rules for missions).

ACUMES Project-Team (http://team.inria.fr/acumes), leaded by Paola Goatin (http://wwwsop.inria.fr/members/Paola.Goatin/index.html), is a joint team from Inria Université Côte d'Azur center in Sophia Antipolis and the Mathematics department Jean-Alexandre Dieudonné (LJAD) in Nice.

The research conducted concerns the analysis and optimization of systems governed by partial differential equations, with applications ranging from fluid and structural mechanics to modeling of biological phenomena, road and pedestrian traffic. In particular, Paola Goatin is an expert of hyperbolic systems of conservation laws, with focus on traffic flow applications, including industrial and international collaborations.

This project is part of the long-term collaboration between ACUMES Project-Team and the Universities of Bio-Bio and Concepcion, see https://team.inria.fr/acumes/assoc-team/noloco/ for details.

Assignment

Candidates for postdoctoral positions are recruited after the end of their Ph.D. or after a first post-doctoral period: for the candidates who obtained their PhD in the Northern hemisphere, the date of the Ph.D. defense shall be later than 1 September 2021; in the Southern hemisphere, later than 1 April 2021.

In order to encourage mobility, the postdoctoral position must take place in a scientific environment that is truly different from the one of the Ph.D. (and, if applicable, from the position held since the Ph.D.); particular attention is thus paid to French or international candidates who obtained their doctorate abroad.

Main activities

The project aims at developing, analyzing and implementing mathematical models based on non-linear and non-local systems of conservation / balance laws which describe phenomena observed in engineering (vehicular/pedestrian traffic flow) or population dynamics.

Conservation laws with flux function depending on integral evaluations of the conserved quantities arise in several models encountered in engineering and life science applications, in which the system dynamics is affected by the state of the system in a neighborhood of the considered location. The presence of non-local terms makes the classical techniques developed for hyperbolic systems of conservation/balance laws inapplicable as such, thus requiring the development of novel analytical and numerical tools. Moreover, the presence of integral terms has a huge impact on the cost of numerical simulations, motivating the design of efficient approximation schemes. The candidate will tackle the

above mentioned analytical and numerical challenges, focusing on engineering applications (sedimentation, traffic, population dynamics, etc) and biological and epidemiological phenomena.

The project will be developed in collaboration with Prof. Luis-Miguel Villada (University of Bio-Bio) and Prof. Raimund Bürger (University of Concepcion).

Skills

Technical skills and level required: Experienced knowledge of Matlab, (alternatively Python), Latex (bibtex, tikz, beamer).

Languages: English level B2

Relational skills: good communication and presentation skills

Other valued appreciated: experience in supervising younger researchers

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 teleworking (after 6 months of employment) and flexible organization of working hours
- Professional equipment available (videoconferencing, loan of computer equipment, etc.)
- Social, cultural and sports events and activities
- Access to vocational training
- Social security coverage

General Information

- **Theme/Domain :** Numerical schemes and simulations
  Scientific computing (BAP E)
- **Town/city :** Sophia Antipolis
- **Inria Center :** Centre Inria d'Université Côte d'Azur
- **Starting date :** 2023-11-01
- **Duration of contract :** 2 years
- **Deadline to apply :** 2023-06-16

Contacts

- **Inria Team :** ACUMES
- **Recruiter :**
  Goatin Paola / Paola.Goatin@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

- PhD in Applied Mathematics.
- Scientific background in analysis, numerical approximation and computer simulations of hyperbolic systems of conservation laws (in particular non-local equations).

Applications can be submitted to Dr. Paola Goatin (paola.goatin@inria.fr) including:

- Detailed CV with a description of the PhD and a complete list of publications with the two most significant ones highlighted

- Motivation letter from the candidate

- 2 letters of recommendations

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

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.