2020-03218 - Internship position 2021 in Applied Mathematics and Engineering Sciences (Possibility to pursue with a PhD) Topic : Particles in the environment: dynamics and statistics of re-mobilization

Level of qualifications required : Master's or equivalent
Other valued qualifications : 3rd year master student in applied mathematics, physics or mechanical engineering
Fonction : Internship Research

Context

This internship is offered within the CaliSto team at Inria, who invested and develop the topic stochastic particle modeling applied to single-phase and multiphase flows througt complex stochastic differenctial equations . This is done in collaborations with researchers that share interest in environmental applications (including meteorologists, hydro-physicists, physicists specialized in turbulence and two-phase flows modeling).

Supervisors
· Mireille Bossy (Inria research director), specialist in stochastic modelling;
· Christophe Henry (Inria starting researcher), specialist in particle-laden flows.

Assignment

Key words : Lagrangian stochastic models, Numerical analysis, particles, agglomeration, fragmentation.

Topic description : Particles are omnipresent in the environment, such as in atmospheric sciences (dispersion of pollutants or radioactive materials) or in marine sciences (plastic contamination in rivers or oceans). These particles can accumulate on surfaces (pollutant deposit on the ground, plastic debris on riverbanks). Due to the action of the flow, such particles can be detached from surfaces and brought back into the flow: this process is often referred to as resuspension in multiphase flows.

Main activities

The aim of this internship is to develop new models for the re-mobilization of particles.

In particular, the student will extend an existing model to account for inter-particle collision mechanisms that have been recently observed in laboratory experiments. For that purpose, the student will take part in

1. the development of the model,
2. its implementation in a software,
3. running simulations,
4. analyzing and validating the results with experimental data.

This internship can lead to publications in international journals.
Motivated candidates will also be encouraged to pursue with a PhD on a related topic

Skills

- Good experience in programming (C, C++, python) and in data analysis
- Fluent in English

Optional competences

- Knowledge in fluid dynamics
- Knowledge in statistical physics
- Rigorous, autonomous and creative thinking
- Interest in environmental applications

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 :** Stochastic approaches Scientific computing (BAP E)
- **Town/city :** Sophia Antipolis
- **Inria Center :** CRI Sophia Antipolis - Méditerranée
- **Starting date :** 2021-03-01
- **Duration of contract :** 6 months

Contacts

- **Inria Team :** CALISTO
- **Recruiter :**
  Bossy Mireille / Mireille.Bossy@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

Candidates should have a solid background in one or more of the following topics: applied mathematics, statistics, physics, or mechanical engineering

To apply : please send an email to both:
· mireille.bossy@inria.fr
· christophe.henry@inria.fr

Applicants are required to send a cover letter, a CV, transcripts of their Master grades, and at least one recommendation letter to the above e-mail address.

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.

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.