Offer #2023-06886

PhD Position F/M On the design of an improved Boussinesq model for real applications: equilibrium between accuracy and performance.

Contract type: Fixed-term contract
Level of qualifications required: Graduate degree or equivalent
Function: PhD Position

Context

The thesis will be carried out under a research agreement between BRGM and the Nouvelle-Aquitaine region. This is a BRGM thesis that will be supervised by INRIA/BRGM. It will take place as described below:

- During the first period (approx. 18 months), during which the work will focus on developing the model and the digital diagram, the PhD student will be housed at INRIA.
- In the second phase, for applications on coastal risk and taking into account the effects of climate, he/she will be at BRGM-Orléans or BRGM-Pessac (DRP/R3C).

Thesis supervisor: Maria Kazolea (INRIA) maria.kazolea@inria.fr, Mario Ricchiuto (INRIA) mario.ricchiuto@inria.fr
Co-supervisor: Andrea G. Filippini (BRGM) a.filippini@brgm.fr

Assignment

For a better knowledge of the proposed research subject:
A state of the art, bibliography and scientific references are available at the following URL, do not hesitate to log in: https://team.inria.fr/cardamom/files/2023/10/brgm_these.pdf

Collaboration:
The recruited person will be in connection with BRGM.

Main activities

Main activities:

- Retrieve available data for historical events at sites in the NVA region subject to strong wave regimes.
- Benchmark the performance of the code in its current state on 2D academic test cases and on the targeted real-world application(s).
- Mathematical study of the model implemented in UHAINA code and analysis of its linear and non-linear properties. Construction of an improved Boussinesq model with simpler resolution, without significant loss of precision in phenomenological representation. Validation on targeted test cases.
- Development of a suitable numerical scheme and a high-performance resolution strategy, based on the literature. Validation on targeted test cases.
- Final benchmarking of the code and application to the study of wave propagation and extreme events on the coast of the NVA region

Skills

The following skills are required: Master's degree in mathematics and scientific computing; knowledge on: numerical modelling; finite element method; finite volumes; high-order methods; programming in C++.

The following skills will be considered a plus: previous knowledge of oceanography and wave propagation; Python programming; use of QGIS software.

The following skills will be valued: autonomy; ability to work as part of a team; fluency in technical and scientific writing and oral communication in French and English; thoroughness.

Languages: French, English
General Information

- **Theme/Domain:** Numerical schemes and simulations
  Scientific computing (BAP E)
- **Town/city:** Talence
- **Inria Center:** Centre Inria de l’université de Bordeaux
- **Starting date:** 2024-01-01
- **Duration of contract:** 3 years
- **Deadline to apply:** 2023-12-31

Contacts

- **Inria Team:** CARDAMOM
- **PhD Supervisor:** Kazolea Maria / maria.kazolea@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.

**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.