Offer #2019-01957

"Numerical modeling of nanophotonic devices using high order finite element type solvers"

Contract type : Fixed-term contract

Renewable contract : Yes

Level of qualifications required : Graduate degree or equivalent

Other valued qualifications : Thèse

Fonction : Temporary scientific engineer

Level of experience : Recently graduated

About the research centre or Inria department

The Inria Sophia Antipolis - Méditerranée center counts 34 research teams as well as 8 support departments. The center's staff (about 500 people including 320 Inria employees) is made up of scientists of different nationalities (250 foreigners of 50 nationalities), engineers, technicians and administrative staff. 1/3 of the staff are civil servants, the others are contractual agents. The majority of the center's research teams are located in Sophia Antipolis and Nice in the Alpes-Maritimes. Four teams are based in Montpellier and two teams are hosted in Bologna in Italy and Athens. The Center is a founding member of Université Côte d'Azur and partner of the I-site MUSE supported by the University of Montpellier.

Context

Nachos is a joint project-team between Inria and the Jean-Alexandre Dieudonné Mathematics Laboratory at University Nice Sophia Antipolis. The team gathers applied mathematicians and computational scientists who are collaboratively undertaking research activities aiming at the design, analysis, development and application of innovative numerical methods for systems of partial differential equations (PDEs) modelling nanoscale light-matter interaction problems. In this context, the team is developing the DIOGENeS [https://diogenes.inria.fr/] software suite, which implements several Discontinuous Galerkin (DG) type methods tailored to the systems of time- and frequency-domain Maxwell equations possibly coupled to differential equations modeling the behaviour of propagation media at optical frequencies. DIOGENeS is a unique numerical framework leveraging the capabilities of DG techniques for the simulation of multiscale problems relevant to nanophotonics and nanoplasmonics.

Assignment

The main objective of this assignement is to further enhance the capabilities of the DG-type high order finite element solvers developed in the framework of the DIOGENeS software suite, and to demonstrate the benefits of these solvers through the study of realistic uses cases pertaning to various applications of nanoscale light-matter interactions. In particular, the team is now actively collaborating with potential end-users of the DIOGENeS software suite who are raising various modeling issues that need to be addressed prior to simulating such realistic uses cases.

Main activities

More precisely, the successful candidate will be assigned two main tasks. On one hand, he/she will develop new methodological functionalities in the various components of the DIOGENeS software suite. These new features are either related to generic core properties of DG-type high order finite element methods for the system of time-domain and frequency-domain Maxwell equations coupled to appropriate differential models of the behaviour of nanostructured materials under optical illumination, or with modeling issues specific to concreate applications. This part of the work will be conducted in close collaboration with Ph.D and postdoctoral fellows of the team who are currently investigating innovative finite element solvers for the solution of the PDE models relevant to nanophotonics and nanoplasmonics. On the other hand, he/she will be in charge of several numerical studies conducted in close collaboration with external (academic and industrial) partners of the team, leveraging the DG-type high order finite element solvers of the DIOGENeS software suite.

Skills

Candidates will hold a Master degree or a PhD degree in applied mathematics/scientific computing or

computational wave physics or computational photonics.

Required skills:
- Sound knowledge of numerical analysis and development of finite element type methods for computational physics;
- A concrete experience in numerical modeling for computational electromagnetics will be an asset;

- Strong programming skills and exposure to object-oriented model;

- Knowledge and experience of Fortran 95/2000x;

- Fluent spoken and written English.

Benefits package

- Subsidised catering service
- Partially-reimbursed public transport
- Social security
- Paid leave
- Flexible working hours
- Sports facilities

Remuneration

Gross salary : between 2632€ and 2936€ (depends on the experience)

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 :** 2020-07-01
- **Duration of contract :** 12 months
- **Deadline to apply :** 2020-12-31

Contacts

- **Inria Team :** ATLANTIS
- **Recruiter :**
  Lanteri Stéphane / Stephane.Lanteri@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.