Offre n°2025-08770

Post-Doctoral Research Visit F/M Postdoctoral Position -- Discrete-time output feedback sliding mode methods.

Le descriptif de l'offre ci-dessous est en Anglais

Type de contrat : CDD

Niveau de diplôme exigé : Thèse ou équivalent

Fonction : Post-Doctorant

A propos du centre ou de la direction fonctionnelle

The Inria Grenoble research center groups together almost 600 people in 23 research teams and 7 research support departments.

Staff is present on three campuses in Grenoble, in close collaboration with other research and higher education institutions (University Grenoble Alpes, CNRS, CEA, INRAE, …), but also with key economic players in the area.

Inria Grenoble is active in the fields of high-performance computing, verification and embedded systems, modeling of the environment at multiple levels, and data science and artificial intelligence. The center is a top-level scientific institute with an extensive network of international collaborations in Europe and the rest of the world.

Contexte et atouts du poste

Within the framework of the ANR SlimDisc collaborative project between Centre Inria de l'Université Grenoble Alpes, Inria Lille, and Ecole Central de Nantes.

The TRIPOP team is a joint research team of Centre Inria de l'Université Grenoble Alpes and of the Laboratoire Jean Kuntzmann (LJK). This new team is a follow up of the BIPOP team (2003–2017).

The team is mainly concerned with the modeling, the mathematical analysis, the simulation and the control of nonsmooth dynamical systems. Nonsmooth dynamics concerns the study of the time evolution of systems that are not smooth in the mathematical sense, i.e., systems that are characterized by a lack of differentiability, either of the mappings in their formulations, or of their solutions with respect to time.The team is one of the few in the world that has brought together researchers in applied maths, control theory, computational mechanics and scientific computing in the field of nonsmooth dynamics. In mechanics, the main instances of nonsmooth dynamical systems are multibody systems with Signorini unilateral contact, set-valued (Coulomb-like) friction and impacts. In Electronics, examples are found in switched electrical circuits withe ideal components (diodes, switches, transistors). In Control, nonsmooth systems arise in the sliding mode control theory and in optimal control. A lot of examples can also be found in cyber-physical systems (hybrid systems), in transportation sciences, in mathematical biology or in finance.

Mission confiée

The selected candidate will be responsible for developing controllers for finite-dimensional dynamical systems, employing set-valued sliding-mode state observers and/or differentiators implemented in discrete time. Additionally, the candidate will perform the associated theoretical analyses of the resulting closed-loop.

The primary challenge involves investigating how discretization affects the closed-loop behavior, specifically concerning stability and robustness properties. This will include analyzing which components of the closed-loop system (observer and/or controller) are best suited for discretization methods such as backward Euler or semi-implicit methods.

Another objective is the development of a software package designed for the simulation and real-time computation of set-valued controllers and observers/differentiators using specific discretization techniques (e.g., backward Euler, semi-implicit methods). This task requires developing appropriate numerical solvers suitable for practitioners who may not have extensive knowledge of the underlying theoretical concepts.

Principales activités

The main activities of the selected candidate include:

- To study the state-of-the-art bibliography on the subject.

- To propose ideas for the analysis and design of the mathematical models under consideration.
- To make numerical simulations to illustrate the suitability of the developed methods.
- To develop a software library in Python for the numerical implementation of discrete-time sliding mode observers/controllers/differentiators.
- To write internal reports, scientific papers.
- To present the obtained results in scientific events, (conferences, seminars, workshops, etc).

Name of supervisors:

Félix A. Miranda-Villatoro (TRIPOP team, Centre Inria de l'Université Grenoble Alpes)

Bernard Brogliato (TRIPOP team, Centre Inria de l'Université Grenoble Alpes)

Compétences

Technical skills and level required : PhD in automatic control, applied mathematics, or a related area.

Languages : English, French.

Other valued appreciated : Knowledge on convex optimization algorithms and programming skills in Python, C++.

Avantages

- 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 (90 days / year) 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
- Complementary health insurance under conditions

Rémunération

2788€ gross salary / month

Informations générales

- **Thème/Domaine :** Optimisation et contrôle de systèmes dynamiques
- **Ville :** Montbonnot
- **Centre Inria :** Centre Inria de l'Université Grenoble Alpes
- **Date de prise de fonction souhaitée :** 2025-09-01
- **Durée de contrat :** 2 ans
- **Date limite pour postuler :** 2025-04-30

Contacts

- **Équipe Inria :** TRIPOP
- **Recruteur :**
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A propos d'Inria

Inria est l'institut national de recherche dédié aux sciences et technologies du numérique. Il emploie 2600 personnes. Ses 215 équipes-projets agiles, en général communes avec des partenaires académiques, impliquent plus de 3900 scientifiques pour relever les défis du numérique, souvent à l'interface d'autres disciplines. L'institut fait appel à de nombreux talents dans plus d'une quarantaine de métiers différents. 900 personnels d'appui à la recherche et à l'innovation contribuent à faire émerger et grandir des projets scientifiques ou entrepreneuriaux qui impactent le monde. Inria travaille avec de nombreuses entreprises et a accompagné la création de plus de 200 start-up. L'institut s'e?orce ainsi de répondre aux enjeux de la transformation numérique de la science, de la société et de l'économie.

L'essentiel pour réussir

Interested candidates must hold a PhD in control theory, applied mathematics, or a closely related field.

Candidates are required to have a solid mathematical background, with knowledge of dynamical systems and proficiency in standard linear and nonlinear control methodologies (e.g., Lyapunov methods, sliding mode control). Programming skills in Python (or C++), are highly desirable and knowledge on convex optimization algortihms would be advantageous.

Excellent proficiency in English, including strong academic writing skills, is also required.

Attention: Les candidatures doivent être déposées en ligne sur le site Inria. Le traitement des candidatures adressées par d'autres canaux n'est pas garanti.

Consignes pour postuler

Applications must be submitted online on the Inria website.

Processing of applications sent by other channels is not guaranteed.

Sécurité défense :
Ce poste est susceptible d'être affecté dans une zone à régime restrictif (ZRR), telle que définie dans le décret n°2011-1425 relatif à la protection du potentiel scientifique et technique de la nation (PPST). L'autorisation d'accès à une zone est délivrée par le chef d'établissement, après avis ministériel favorable, tel que défini dans l'arrêté du 03 juillet 2012, relatif à la PPST. Un avis ministériel défavorable pour un poste affecté dans une ZRR aurait pour conséquence l'annulation du recrutement.

Politique de recrutement :
Dans le cadre de sa politique diversité, tous les postes Inria sont accessibles aux personnes en situation de handicap.