



**Offre n°2025-08914**

## **Post-Doctoral Research Visit F/M Discretisation of Homogeneous Sliding Mode Controllers for Infinite Dimensional Systems**

**Type de contrat :** Fixed-term contract

**Niveau de diplôme exigé :** PhD or equivalent

**Fonction :** Post-Doctoral Research Visit

**Niveau d'expérience souhaité :** Up to 3 years

### **A propos du centre ou de la direction fonctionnelle**

Created in 2008, the Inria center at the University of Lille employs 360 people, including 305 scientists in 15 research teams. Recognized for its strong involvement in the socio-economic development of the Hauts-De-France region, the Inria center at the University of Lille maintains a close relationship with large companies and SMEs. By fostering synergies between researchers and industry, Inria contributes to the transfer of skills and expertise in the field of digital technologies, and provides access to the best of European and international research for the benefit of innovation and businesses, particularly in the region.

For over 10 years, the Inria center at the University of Lille has been at the heart of Lille's university and scientific ecosystem, as well as at the heart of Frenchtech, with a technology showroom based on avenue de Bretagne in Lille, on the EuraTechnologies site of economic excellence dedicated to information and communication technologies (ICT).

### **Contexte et atouts du poste**

**This postdoctoral research is within the framework of a partnership of the project ANR SLIMDISC** dedicated to discretization of sliding mode controllers for infinite dimensional control systems.

## Mission confiée

### Assignments :

With the help of Andrey Polyakov, the recruited person will be taken to develop discretization algorithms of homogeneous sliding mode controllers for various infinite dimensional control system.

### For a better knowledge of the proposed research subject :

- A. Polyakov, Generalized Homogeneity in Systems and Control, Second Edition, Springer, 2025
- A. Polyakov, D. Efimov, X. Ping, Consistent discretization of homogeneous finite/fixed-time controllers for LTI systems, Automatica, 2023
- B. Brogliato, A. Polyakov, Digital implementation of sliding mode control via the implicit method: A tutorial, International Journal of Robust and Nonlinear Control, 2021
- A. Polyakov, D. Efimov, B. Brogliation, Consistent Discretization of Finite-time and Fixed-time Stable Systems, SIAM Journal on Control and Optimization, 2019

### Collaboration :

The recruited person will be in connection with partners of ANR SLIMDISC (Inria Grenoble and CNRS L2N, Nantes).

### Responsibilities :

The person recruited is responsible for theoretical developments of discretization algorithm and thier implementation in MATLAB. Well-developed and well-implemented algorithms may be included in Homogeneous Control Systems Toolbox for MATLAB (<https://chercheurs.lille.inria.fr/~polyakov/hcs/index.html>)

## Principales activités

### Main activities:

- development of discretization algorithms for sliding mode controllers
- theoretical justification of results
- implementation of discretization algorithms in MATLAB (and/or Python)

- writing research papers
- presentation of results at conferences and project meetings

#### **Additional activities:**

- experimental validation of results

## **Compétences**

Technical skills and level required :

- PhD in Control Theory (or in Applied Mathematics) is necessary
- good knowledge of infinite dimensional control systems (e.g., control of PDE models) is necessary
- good knowledge of MATLAB (or Python) is necessary
- a knowledge of conventional methods of discretization of continuous-time systems (e.g., ODEs and PDEs) is welcome
- a knowledge of homogeneous and/or sliding mode control systems is welcome
- an experience of practical control applications is welcome

Languages :

- good oral and writing English is necessary
- a knowledge of French is not required but welcome

## **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 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

## Rémunération

Gross salary by month : 2788€

## Informations générales

- **Thème/Domaine** : Optimization and control of dynamic systems  
Software engineering (BAP E)
- **Ville** : Villeneuve d'Ascq
- **Centre Inria** : [Centre Inria de l'Université de Lille](#)
- **Date de prise de fonction souhaitée** : 2025-12-01
- **Durée de contrat** : 1 year, 6 months
- **Date limite pour postuler** : 2025-06-30

## Contacts

- **Équipe Inria** : [VALSE](#)
- **Recruteur** :  
Polyakov Andrey / [Andrey.Polyakov@inria.fr](mailto:Andrey.Polyakov@inria.fr)

## 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'efforce ainsi de répondre aux enjeux de la transformation numérique de la science, de la société et de l'économie.

## L'essentiel pour réussir

An applicant should have a solid background in mathematical control theory or in applied mathematics. A basic knowledge of infinite dimensional systems (e.g., PDEs) is necessary. Good programming skills in MATLAB or Python are required too. A knowledge of numerical methods for discretization of continuous-time finite/infinite dimensional systems (e.g., ODEs and PDEs) is welcome. A basic

knowledge of sliding mode and/or homogeneous control systems is welcome as well. In the case of absence of the latter knowledges, the applicant must be ready to learn them in a rather short time in order to complete successfully all research tasks.

**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

CV + cover letter

### **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.