Offre n°2025-08696

Post-Doctoral Research Visit F/M Self-Synchronization in Power Networks with Periodic Dynamics

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

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

The transition to a low-carbon future is part of economic development plans worldwide, and it has enormous implications for the operation of future power systems. In particular, in AC systems, the replacement of synchronous generators by inverter-interface devices results in a significant reduction of the available system

inertia and can lead to much faster frequency dynamics in the grid. Such inverter-dominated power systems are called low-inertia systems. In order to ensure affordable, efficient and sustainable operation in such systems, novel methodical, robust and flexible control solutions are needed. Motivated by this, two ANR/DFG projects, SyNPiD (2021-2024) and SyNNum (2025-2028) are dedicated to the development of a methodical framework for the global analysis and control design in nonlinear dynamic systems, which are periodic in a part of the state coordinates. The latter is an intrinsic property of AC power systems and, due to the periodicity, also leads to the existence of multiple equilibria. A unique feature of the proposed research methodology is that it explicitly exploits the inherent periodicity of the power system dynamics in order to relax the usual requirements of standard stability analysis and control design methods, such as the periodicity of Lyapunov functions, which usually hamper the establishment of global properties for AC power systems. A special focus will be placed on stability analysis and controller design for self-synchronization mechanisms. For an interconnected system, self-synchronization means that synchronization occurs without any artificially introduced external signals or actions. The results to be obtained will form a bridge between innovative theoretical concepts for control synthesis and an important application area dealing with future sustainable and green energy systems, which are at the core of many European and national scientific initiatives.

Principales activités

1) Theoretical developments of control design methods applicable to periodic state systems

2) Application of artificial neural networks to the design of Leonov functions

Compétences

- PhD in Applied Mathematics or Automatic Control
- A strong background in analysis of stability for complex dynamic systems
- A background in Matlab programming will be an advantage
- Interest in practical problems

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

2788€ per month

Informations générales

- **Thème/Domaine :** Optimisation et contrôle de systèmes dynamiques
- **Ville :** Villeneuve d'Ascq
- **Centre Inria :** Centre Inria de l'Université de Lille
- **Date de prise de fonction souhaitée :** 2025-05-01
- **Durée de contrat :** 2 ans
- **Date limite pour postuler :** 2025-03-31

Contacts

- **Équipe Inria :** VALSE
- **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.

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.