

**Research Training Group  $\pi^3$ :**  
**Parameter Identification – Analysis, Algorithms, Applications**



$\pi^3$  is a collaborative project between mathematicians of the Center for Industrial Mathematics (ZeTeM); mathematicians in analysis, topology, and statistics; and applied scientists of the University of Bremen. We invite applications for a

**PhD position (75% of a full position)**

in the area of nonlinear optimization and dynamical systems in the framework of project R2-7: **Parameter and Structure Identification for Complex Dynamical Systems.**

This project addresses joint identification problems for both the structure and the parameters of a model for dynamic processes or systems. Complex dynamical systems often consist of several subsystems which belong to different physical fields (multiphysical systems). The subsystems come along with different established modeling approaches, e.g. multi-body systems in mechanics, circuit models in electronics, and CFD models in fluid dynamics. However, for every submodel, the accuracy, i.e. order, dimensions, or time-scale, has to be chosen. Thus, there does not exist one single model-structure, for which parameter identification (PI) has to be performed. Instead, PI has to be combined with structure identification (SI). Moreover, real-world technical systems also possess interfaces or subsystems that can only be modeled by generic black-box models, i.e. look-up-tables in the simplest case. While PI problems can be addressed by efficient nonlinear optimization solvers, SI problems might lead to large combinatorial problems and finding the optimal structure is a machine learning task.

We are searching for an enthusiastic and committed researcher with interest in optimization and dynamical systems as well as in developing and applying new mathematical models and algorithms. Within the research training group, the PhD student will be part of the Optimisation and Optimal Control group at the Center for Industrial Mathematics, working under the supervision of Dr. Kathrin Flaßkamp.

**Requirements:**

- M.Sc. or equivalent degree with excellent grades in mathematical sciences or related fields.
- Skills in scientific computer programming.
- Experience in the fields dynamical systems and optimization is advantageous.
- Industry or research internships are advantageous.
- Fluency in English.
- Desire to work in an international and interdisciplinary team.

The position is for a fixed term of 3 years. The earliest starting date for each position in the research training group is 1 October 2019. The salary is according to the German federal employee scale TV-L E13, 75% of a full position (i.e., approximately € 1700-1900 monthly net income). This call is open until all positions are filled.

Applicants are invited to submit their letter of motivation including a reference to PhD project R2-7, an extended CV including copies of certificates, a publication list (as far as applicable), one recommendation letter from a math professor, and contact information of two more scientists as possible referees.

The recommendation letter should be sent by the math professor directly to us ([pi3-application@math.uni-bremen.de](mailto:pi3-application@math.uni-bremen.de)), while the application file should only include her/his name and affiliation.

All relevant documents, quoting the official reference number A 297 / 18, should be submitted by January 13, 2019, – preferably electronically as a single PDF file to [pi3-application@math.uni-bremen.de](mailto:pi3-application@math.uni-bremen.de) – to the  $\pi^3$ -coordination: Dr. Tobias Kluth, Zentrum für Technomathematik, Universität Bremen, Bibliothekstr. 5, 28359 Bremen.

The University of Bremen has received a number of awards for its gender and diversity policies and is particularly aiming to increase the number of female researchers. Gender equality will be given special emphasis within this research training group. Applications from female candidates, international applications and applications of academics with a migrant background are explicitly welcome.

Disabled persons with the same professional and personal qualifications will be given preference.

Further enquiries may be addressed to

Dr. Kathrin Flaßkamp  
Center for Industrial Mathematics  
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