School of Science, Department of Mathematical Sciences

Loughborough University

Research Associate in Numerical Analysis

Domain decomposition methods based on proper generalised decomposition for parametric heterogeneous problems

REQ210562

As part of the University's ongoing commitment to redeployment, please note that this vacancy may be withdrawn at any stage of the recruitment process if a suitable redeployee is identified.

Project Description

This project is funded by an EPSRC grant entitled "Domain decomposition methods based on proper generalised decomposition for parametric heterogeneous problems".

The overall aim of this project is to develop new robust, fast, and reliable algorithms for heterogeneous systems described by different but coupled parametric partial differential equations in different regions within the system. This will be done by combining domain decomposition (DD) techniques and the proper generalised decomposition (PGD) method. The goal is to lay the foundation of the DD-PGD method for heterogeneous problems and to develop algorithms that will permit to tackle the computational challenges encountered in the virtual design of coupled heterogeneous systems.

The project will be carried out jointly by the RA and Dr Marco Discacciati as the Supervisor/Principal Investigator (PI).

Job Description

Job Grade: Specialist and Supporting Academic Grade 6.

Job Duties:

- To become familiar with relevant literature on domain decomposition (DD) methods and proper generalised decomposition (PGD) methods for problems governed by partial differential equations.
- To develop the theoretical framework of a methodology that combines DD and PGD for the numerical approximation of coupled parametric heterogeneous problems for virtual design.
- To develop computational software that implements the new methodology to support virtual prototyping and optimal design with applications in science and engineering.
- To write research papers appropriate for leading international journals.
- To present results in leading international conferences.
- To collaborate with research fellows, and students in the group.
- To support the PI by enhancing relationships with existing collaborators and by assisting the establishment of relationships with new collaborators.
- To undertake tasks assigned by the PI.
- There will be an opportunity to do a small amount of teaching in the Department of Mathematical Sciences, if desired.

- To engage in training programmes in the University (or elsewhere) that are consistent with the needs and aspirations of the project and those of the Department.
- To undertake other duties as may be reasonably requested and that are commensurate with the nature and grade of the post.

Points to Note

The purpose of this job description is to indicate the general level of duties and responsibility of the post. The detailed duties may vary from time to time without changing the general character or level of responsibility entailed.

Special Conditions

All staff have a statutory responsibility to take reasonable care of themselves, others and the environment and to prevent harm by their acts or omissions. All staff are therefore required to adhere to the University's Health, Safety and Environmental Policy & Procedures.

All staff should hold a duty and commitment to observing the University's Equality & Diversity policy and procedures at all times. Duties must be carried out in accordance with relevant Equality & Diversity legislation and University policies/procedures.

Successful completion of probation will be dependent on attendance at the University's mandatory courses which include Respecting Diversity and, where appropriate, Recruitment and Selection.

Organisational Responsibility

Reports to the Principal Investigator, Dr Marco Discacciati.

Person Specification

Your application will be reviewed with respect to meeting the essential and desirable criteria listed below. Your application will be reviewed against the essential and desirable criteria listed below. Applicants are strongly advised to explicitly state and evidence how they meet each of the essential (and desirable) criteria in their application. Stages of assessment are as follows:

1 – Application
2 – Test/Assessment Centre/Presentation
3 – Interview

Essential Criteria

Area	Criteria	Stage
Experience	Strong background in numerical analysis of partial differential equations and finite element method.	1,2,3
	Publication track record in international journals.	1,3
Skills and abilities	Excellent knowledge of the finite element method for partial differential equations.	1,2,3
	Strong computer programming skills in Matlab, Python, or other suitable language for scientific computing.	1,2,3
	Excellent written and oral communication skills.	1,2,3
	Self-motivated with ability to organise own work with minimal supervision and to prioritise in response to deadlines.	3
	Excellent interpersonal and organisational skills.	1,3
	Ability to work as part of a team and to collaborate with others.	1,3
Training	Willingness to undertake further training as required.	3
Qualifications	PhD in Mathematics, Physics, Engineering, or a closely related area.	1
Other	Commitment to observing the University's Equal Opportunities policy at all times.	3

Desirable Criteria

Area	Criteria	Stage
Experience	Experience in domain decomposition methods for partial differential equations.	1,2,3
	Experience in model order reduction methods, especially, proper generalised decomposition.	1,2,3
Skills and abilities	A strong publication track record.	1
	Development of software for scientific computing.	1,2,3
Qualifications	Prior postdoctoral experience.	1

Conditions of Service

The position is full time and fixed for 24 months. Salary will be on Specialist and Supporting Academic Grade 6 £30,942 to £40,322 per annum, at a starting salary to be confirmed on offer of appointment.

The appointment will be subject to the University's Terms and Conditions of Employment for Grades 6 and above staff, details of which can be found here.

The University is committed to enabling staff to maintain a healthy work-home balance and has a number of family-friendly policies which can be found here.

The University offers a wide range of employee benefits which can be found here.

We also offer an on-campus nursery with subsidised places, subsidised places at local holiday clubs and a childcare voucher scheme (further details are available at: http://www.lboro.ac.uk/services/hr/a-z/childcare-information---page.html

In addition, the University is supportive, wherever possible, of flexible working arrangements.
We also strive to create a culture that supports equality and celebrates diversity throughout the campus. The University holds a Bronze Athena SWAN award which recognises the importance of support for women at all stages of their academic career. For further information on Athena SWAN see http://www.lboro.ac.uk/services/hr/athena-swan/