School of Science
Department of Mathematical Sciences

Loughborough University

Research Associate in Perturbation Theory for Dynamical Systems and Ordinary Differential Equations
Project "Adiabatic invariance in two-frequency dynamical systems with separatrix crossing"

Job Ref: REQ180867

As part of the University's ongoing commitment to redeployment, please note that this vacancy may be withdrawn at any stage of the recruitment process if a suitable redeployee is identified.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 is a project under the direction of Prof Anatoly Neishtadt on The Leverhulme Trust funded project "Adiabatic invariance in two-frequency dynamical systems with separatrix crossing", in the area of perturbation theory for dynamical systems and ordinary differential equations. It aims to provide an asymptotic description of evolution of two-frequency dynamical systems in the case when this evolution leads to passage through a separatrix - a singular surface in the phase space which separates domains with different regimes of motion. The Research Associate will work on the project in collaboration with the PI.

Job Description

Job Grade: Specialist and Supporting Academic Grade 6

Job Purpose

To conduct a rigorous mathematical research and supporting numerical study on adiabatic invariance in two-frequency dynamical systems with separatrix crossing with the final goal to provide an asymptotic description of evolution in this class of dynamical systems.

Job Duties

- To become familiar with existing results on averaging and adiabatic invariance in slow-fast dynamical systems.
- To develop rigorous asymptotic estimates related to separatrix crossing in two-frequency dynamical systems.
- To conduct supporting numerical study on separatrix crossing in two-frequency dynamical systems.
- To feed back to the project team on progress, to make recommendations for next steps.
- Write up regular progress reports and present outcomes to all investigators and collaborators.
- Travel to attend meetings and make presentations both within the project partners working group and to external stakeholders.
- To support the project team by enhancing relationships with existing collaborators and by assisting the establishment of relationships with new collaborators.
- To write research papers suitable for publication in high quality academic journals.
- To attend and contribute to conferences.
- To contribute to project promotion and public engagement events.
- Contribute ideas for new research and enterprise directions.
- Maintain confidentiality at all times and ensure that intellectual property (IPR) agreements are not violated.

- To assist the academic staff in the project team with the supervision of undergraduate MSc and PhD project work and day-today supervision and support of other researchers.
- Where appropriate, to deliver teaching and tutorial sessions to students.
- 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.
- 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 PI of the project and to the Head of Department of Mathematical Sciences.

Person Specification

Your application will be reviewed with respect to meeting 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	Background in dynamical systems and ordinary differential equations theory	1, 3
	Experience of conducting a rigorous mathematical research in perturbation theory, averaging of perturbations, slow-fast dynamical systems, dynamics of skew products, adiabatic invariants	1, 3
	Authoring original work for academic journal papers, conference papers or technical reports	1
Skills and abilities	Ability to carry out high-level rigorous mathematical research	1, 3
	Working knowledge of methods of theory of ordinary differential equations	1, 3
	Competence in IT skills	1, 3
	Ability to work individually and to collaborate with others	1, 3
	Excellent written and oral communication skills	3
	Self-motivated with ability to meet deadlines	3
	Excellent interpersonal, and organisational skills	3
	Ability to write project reports and make technical presentations to industrial and academic research groups	1, 3
	Knowledge of relevant Health & Safety issues	3
Training	Demonstrate evidence of having undertaken further training	1
Qualifications	PhD (or near completion) in Mathematics	1
Other	Commitment to observing the University's Equal Opportunities policy at all times	3

Desirable Criteria

Area	Criteria	Stage
Experience	Have papers published in peer-reviewed journals in the area of dynamical systems and ordinary differential equations theory	1
	Developing proposals for funding from external agencies	1
	Working in a high quality academic research environment	1
	Experience of teaching and / or supervision of students in relevant areas	1
Skills and abilities	Authoring original work, in the highest quality refereed academic journals	1
	A strong publication track record	1
	Computer programming skills	1, 3
Qualifications	PhD (or near completion) in the area of dynamical systems and ordinary differential equations theory	1

Conditions of Service

The position is full time and fixed term for 36 months. Salary will be on Specialist and Supporting Academic Grade 6, (£30,395 - £39,609) per annum, at a starting salary to be confirmed on offer of appointment.

The appointment will be subject to the University's normal Terms and Conditions of Employment for Grade 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 are available at http://www.lboro.ac.uk/services/hr/a-z/family-leave-policy-and-procedure---page.html.

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/