

Research Associate - Gas Kinetic Simulation of Gas Flows in Porous Media

Department	Mechanical and Aerospace Engineering (www.strath.ac.uk/mae/)		
Faculty	Faculty of Engineering (www.strath.ac.uk/engineering/)		
Staff Category	Research	Reference No	I08083
Reports To	The Head of Department, through Professor Yonghao Zhang	Grade:	7
Salary Range:	£31604 - £38833	Contract Type:	Fixed Term (36 months)
FTE:	I (35 hours/week)	Closing Date	Sunday, 4 March 2018

Job Advert

The University of Strathclyde seeks to recruit a postdoctoral Research Associate for 3 years to investigate the behaviour of methane gas inside porous rock media using gas kinetic simulations. This is part of a joint research project between the University of Strathclyde, Edinburgh University, and King Fahd University of Petroleum & Minerals (KFUPM) on the dynamics of gas flows in underground reservoirs.

The Research Associate will join the James Weir Fluids Laboratory (<http://www.jwfl.ac.uk/>) based within the Department and work with Prof Yonghao Zhang and Dr Lei Wu. The Faculty of Engineering at the University of Strathclyde is one of the largest and most successful engineering faculties in the UK, and the largest in Scotland. The Department of Mechanical and Aerospace Engineering is ranked No. 1 in Scotland by [UK University TIMES Ranking 2017](#). As a leading international technological university, Strathclyde is recognised for its world class research, knowledge exchange and educational programmes.

In this project, we will utilize our recently developed high-performance simulation code based on discrete velocity method including lattice Boltzmann method to study gas transport inside ultra-tight pore networks. The computations will be performed on digital images of real samples and aim to provide essential information for the Darcy-scale simulations and enable reliable reservoir simulations. The research team has access to a range of HPC facilities including the University's HPC (3500 CPU cores) and ARCHER, the UK national supercomputer.

The main objectives of the project are: to further develop the current gas kinetic code using the discrete velocity method for more heterogeneous porous media; to use the molecular dynamics results (in collaboration with Edinburgh University) as boundary condition for gas kinetic simulations at the pore scale; and to use the pore-scale data for upscaling simulations.

To be considered for the role you will be educated to PhD level in applied mathematics, fluid mechanics or computational science, or you have significant, relevant experience in addition to a relevant Degree. You will be able to work independently as well as taking a lead role within a team. You will have sufficient breadth or depth of knowledge in scientific computing and a developing ability to conduct individual research work, to disseminate results and to prepare research proposals. You will have an ability to plan and organise your own workload effectively and an ability to work within a team environment. You will have excellent interpersonal and communication skills, with the ability to listen, engage and persuade, and to present complex information in an accessible way to a range of audiences. As this is a joint project with KFUPM, applicant must be willing and able to visit Saudi Arabia for knowledge exchange and research interactions.

Whilst not essential for the role, applications are welcomed from candidates with expertise in discrete velocity method and parallel computing.

Job Description

Brief Outline of Job:

To undertake the research project on pore-scale study of unconventional gas transport and work closely with academic staff and our project partners contributing to code development and lead pore-scale simulations. To present the research data in international conferences and publish research papers in leading journals. To engage, as required, in relevant teaching, professional and knowledge exchange activities; and input to administrative activities

Main Activities/Responsibilities:

1.	Conduct the research project and focus on improving gas kinetic code performance for porous media.
2.	Develop computational software based on the developed dense gas models to predict permeability of porous media.
3.	Undertake verification and validation of developed models and provide documented case-study evidence for their applicability to simulate flow at the pore-scales.
4.	Disseminate the results of the research to both academic and industrial partners.
5.	As part of a wider research group or programme, develop research objectives and proposals for own or joint research and play a lead role in relation to a specific project, with guidance from senior colleagues as required.
6.	Conduct individual and collaborative research, including determining appropriate research methods based on the current state-of-the-art methods.
7.	Write up research work for publication, individually or in collaboration with colleagues, and disseminate results as appropriate by, for example, peer reviewed journal publications and presentation at conferences.
8.	Participate in the research team by presenting to and attending seminars on research topics.
9.	Identify sources of funding and contribute to the securing of funds for research, including drafting grant proposals and planning for future proposals.
10.	Contribute to the supervision of student projects, providing guidance to students as appropriate.
11.	Plan and manage own workload, with guidance from colleagues as required.
12.	Engage in continuous professional development.
13.	Contribute in a developing capacity to Department, Faculty, and/or University administrative and management functions and committees.

Person Specification

Educational and/or Professional Qualifications

(E=Essential, i.e. a candidate must meet all essential criteria to be considered for selection, D=Desirable)

E.1 Good honours degree, minimum 2:1, in applied mathematics, fluid mechanics, computational science or a related discipline

E.2 PhD in a relevant discipline

Experience

E.3 Research experience in computational fluid dynamics focusing on gas flows especially rarefied gas dynamics

E.4 Experience in scientific computing

E.5 Experience in high-performance computing

D.1 Research experience in kinetic methods including discrete velocity method, lattice Boltzmann method, DSMC.

Job Related Skills and Achievements

- E.6 Developing ability to conduct individual research work, to disseminate results and to prepare research proposals.
- E.7 Excellent interpersonal and communication skills, with the ability to listen, engage and persuade, and to present complex information in an accessible way to a range of audiences.
- E.8 Experience in software development
- D.2 A track record of published research in high-impact journals, demonstrating standards of excellence

Personal Attributes

- E.9 Ability to plan and organise own workload efficiently
- E.10 Ability to lead research projects and to supervise PhD students
- E.11 Ability to work within a team environment.
- D.3 Ability to work both independently and within a research team, with potential to lead a research team
- D.4 Highly motivated and independent researcher who is very keen to establish his/her own independent research group

Other Relevant Factors

- E.12 Willing and able to visit Saudi Arabia for knowledge exchange and research interactions
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Application Procedure

Applicants are required to complete an application form including the name of three referees who will be contacted before interview without further permission, unless you indicate that you would prefer otherwise. Applicants should also submit a Curriculum Vitae and a covering letter detailing the knowledge, skills and experience you think make you the right candidate for the job. Applicants should also complete the Equal Opportunities Monitoring Form.

Other Information

Further information on the application process and working at Strathclyde can be found on our website (<http://www.strath.ac.uk/hr/workforus>).

Informal enquiries about the post can be directed to Yonghao Zhang, Weir Professor of Thermodynamics and Fluid Mechanics (yonghao.zhang@strath.ac.uk).

Probation

Where applicable, the successful applicant will be required to serve a 9 month probationary period.

Pension

The successful applicant will be eligible to join the Universities' Superannuation Scheme. Further information regarding this scheme is available from [Payroll and Pensions](#).

Interviews

Formal interviews for this post will be held on Wednesday, 14 March 2018.

Equality and Diversity

We value diversity and welcome applications from all sections of the community.

The University currently holds a Bronze Athena SWAN award, recognising our commitment to advancing women's careers in science, technology, engineering, maths and medicine (STEMM) employment in academia.

