

Information on Postgraduate Research Scholarship - Ref: M34Impact-MSE4

Faculty:	Engineering and Science	Department:	Computing and Mathematical Sciences
Lead Supervisor:	Dr Samuel Tomlinson		
Project Title:	Lattice-Boltzmann Simulations of Boundary-Layer Flows over Low-Drag Engineered Surfaces		
Project Description:	<p>The Challenge: The aviation, marine and turbomachinery sectors face a sustainability challenge: drag on aircraft wings, ship hulls and turbine blades causes billions of pounds in excess fuel use and CO₂ emissions every year. To reach Net Zero, we must reduce surface drag through engineered fluid–surface interactions. Bio-inspired surfaces, such as shark-skin riblets and lotus-leaf-inspired superhydrophobic textures, have demonstrated drag-reduction potential in laboratory settings. However, translating these concepts into engineered surfaces for real-world transport applications remains an open scientific problem.</p> <p>The Project: This PhD studentship is the computational component of a wider research project to generalise boundary-layer theory to include engineered surfaces. While classical boundary-layer theory assumes the no-slip condition at the surface, this project asks: how is drag modified when a slip velocity is introduced at the surface?</p> <p>You will use High-Performance Computing (HPC) and the Lattice-Boltzmann Method (LBM), a mesoscopic computational method, to model flows over a variety of engineered surfaces. You will investigate how engineered surfaces can delay flow separation and influence laminar–turbulent transition, with implications for drag reduction in aircraft, marine and turbomachinery applications.</p> <p>Methodology: Using the open-source software, you will:</p> <ol style="list-style-type: none"> 1) Simulate: Model boundary-layer flows over aircraft wings and turbine blades with engineered surfaces and compare numerical results with theoretical predictions from classical boundary-layer theory extended to slip-modified boundary conditions. 2) Resolve: Move beyond effective slip-length approximations to fully resolve the micro-scale geometry of engineered surface textures within the LBM framework. 3) Integration with ML/AI: Apply data-driven methods to construct reduced-order models that bridge analytical theory and high-fidelity simulation data, enabling rapid drag prediction across surface parameter spaces. <p>The Environment: This studentship is fully and securely funded by the University's £9M Research England-funded M³4Impact expansion programme. This project is part of the wider Computational Science and</p>		

	<p>Engineering Group's goals and will be a foundational project for the Climate and Sustainability Modelling group:</p> <ol style="list-style-type: none"> 1) Supervision: You will be supervised by Dr. Samuel Tomlinson, a Lecturer in Materials Science & Engineering with a track record of research in fluid mechanics, boundary-layer theory and engineered surfaces. 2) Collaboration: You will be co-supervised by Dr. Tim Reis, an expert in LBM with links to the lattice Boltzmann community. The project also features collaborative links with Imperial College London, providing access to the UK's modelling community. <p>Career Growth: As the founding PhD student of the Climate and Sustainability Modelling group, you will be fully embedded within the wider M³4Impact doctoral cohort, benefiting from training in HPC, software development and academic leadership.</p>
Duration:	4 years, Full-Time Study or 7 years, Part-Time Study
<p>Bursary available (subject to satisfactory performance):</p> <p>Rates below are for full time (FT) mode. Year 1: £24,780 (£20,780 UKRI rate + London weighting = £2,000 + Enhanced bursary = £2,000) Year 2: In line with UKRI rate + London weighting = £2,000 + Enhanced bursary = £2,000 Year 3: In line with UKRI rate + London weighting = £2,000 + Enhanced bursary = £2,000 Year 4*: In line with UKRI rate + London weighting = £2,000 + Enhanced bursary = £2,000</p> <p>In addition, the successful candidate will receive a contribution to tuition fees, equivalent to the University Home Rate, currently £5,006 (FT), for the duration of their scholarship. International applicants may need to pay the remainder tuition fee for the duration of their scholarship**.</p> <p>This fee is subject to an annual increase.</p> <p>* The bursary is for 3 years with a potential extension of up to a maximum of 12 months. Funding extensions may be granted if the student demonstrates, to the satisfaction of the M³4Impact Principal Investigators and PhD supervisors, that the thesis can be completed during the granted extension period. ** For exceptional international applicants the tuition fees may be covered by the M³4Impact</p>	
Person Specification of Essential (E) or Desirable (D) requirements:	
Criteria:	E or D
Education and Training:	
<ul style="list-style-type: none"> • 1st Class or 2nd class, First Division (Upper Second Class) honours degree or a taught master's degree (UK or UK equivalent) in a relevant area (e.g., Aerospace Engineering, Applied Mathematics, Physics, Mechanical Engineering or Computer Science) or equivalent professional experience. 	E
<ul style="list-style-type: none"> • For those whose first language is not English, a language proficiency score of at least IELTS 6.5 overall with a minimum of 6.0 in all elements (or equivalent). 	E
Experience & Skills:	

<ul style="list-style-type: none"> • Previous experience of undertaking research (e.g., undergraduate or taught master’s dissertation). 	E
<ul style="list-style-type: none"> • Strong programming skills in C++, Python, MATLAB or similar scientific computing languages. 	E
<ul style="list-style-type: none"> • Knowledge of Fluid Dynamics, Aerodynamics or Continuum Mechanics. 	E
<ul style="list-style-type: none"> • Motivation to learn advanced computational techniques (HPC/Lattice-Boltzmann). 	E
<ul style="list-style-type: none"> • Experience with Computational Fluid Dynamics (CFD) solvers (e.g., OpenFOAM, COMSOL). 	D
<ul style="list-style-type: none"> • Interest or experience in Machine Learning/AI applied to physical systems. 	D
<ul style="list-style-type: none"> • Knowledge of boundary-layer theory or asymptotic analysis. 	D
Personal Attributes:	
<ul style="list-style-type: none"> • Strong personal motivation and resilience, with an understanding of the self-directed nature of a research degree. 	E
<ul style="list-style-type: none"> • An ability to work independently, take ownership of a long-term project and make consistent progress. 	E
<ul style="list-style-type: none"> • A curiosity for sustainable engineering and climate technologies. 	E
<ul style="list-style-type: none"> • Willingness to travel for collaboration (Imperial College London) and international conferences. 	D
Other Requirements:	
<ul style="list-style-type: none"> • This scholarship may require Academic Technology Approval Scheme (ATAS) approval for the successful candidate if from outside of the EU/EEA. 	E
<ul style="list-style-type: none"> • The scholarship must commence by 01 October 2026. 	E
Closing date for applications:	midnight UTC on 01 June 2026
For further information contact:	Dr Samuel Tomlinson (Samuel.Tomlinson@greenwich.ac.uk)
<p>Making an application: Please read this information before making an application. Information on the application process is available at: https://www.gre.ac.uk/research/study/apply/application-process. Applications need to be made online via this link. No other form of application will be considered.</p> <p>All applications must include the following information. Applications not containing these documents will not be considered.</p> <ul style="list-style-type: none"> • Scholarship Reference Number (“M34Impact-MSE4”)– included in the personal statement section together with your personal statement as to why you are applying • a CV including 2 referees * • academic qualification certificates/transcripts and IELTS/English Language certificate if you are an international applicant or if English is not your first language or you are from a country where English is not the majority spoken language as defined by the UK Border Agency * <p><i>*upload to the qualification section of the application form. Attachments must be in PDF format.</i></p> <p>Before submitting your application, you are encouraged to liaise with the Lead Supervisor on the details above.</p>	