THE UNIVERSITY OF MANCHESTER

PARTICULARS OF APPOINTMENT

FACULTY OF SCIENCE & ENGINEERING

SCHOOL OF MECHANICAL, AEROSPACE & CIVIL ENGINEERING

MECHANICAL AND AERONAUTICAL ENGINEERING

LECTURER IN FLUIDS SIMULATION / DIGITAL TWINS (F&E)

VACANCY REF: SAE-024993

Salary:	Grade 7 £45,585 to £56,021 per annum, depending on relevant experience
Hours:	Full Time
Duration:	Permanent
Location:	Oxford Road, Manchester

Enquiries about the vacancy, shortlisting and interviews:
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Email: Alistair.revell@manchester.ac.uk

Background

The University of Manchester was created in 2004 by bringing together The Victoria University of Manchester and UMIST, two of Britain's most distinguished universities, to create a powerful new force in British Higher Education. Located in the heart of the city, our campus buzzes with student activities both day and night, fostering a vibrant environment for both teaching and research.

The vision for the University of Manchester is to be one of the finest universities in the world. The University is one of the largest in the UK and has teaching and research in more subjects than any other single-site British University. Students benefit from unrivalled facilities while staff benefit from an environment which is appropriate for a global centre for research excellence.

The Faculty of Science and Engineering, one of the largest and most comprehensive faculties, includes two Schools: Engineering and Natural Sciences. Split across these schools are ten departments/ Historically, the Faculty has been at the forefront of major 20th-century technological advancements, such as Rutherford's atomic splitting and the development of the world's first modern computer. Manchester has long been a leader in engineering, with historical routes dating back to the Industrial Revolution and the foundation of The Institute of Mechanics in 1824. Today, the taught programmes of Mechanical, Aerospace and Civil Engineering welcome over 2000 students across the spectrum of courses, and our related departments are a home to over 200

academic and research staff. In this context we host world-leading academic researchers across a range of domains, including structures in extreme environments, innovative advanced manufacturing, engineering resilient systems, low carbon and renewable energy engineering, advanced robotics and autonomous systems, aerospace engineering and nuclear engineering. A cross-cutting cornerstone of our world-leading research activity is the advancement of computational engineering – with application to all of the above-mentioned domains.

Faculty members are encouraged to participate in collaborative, multidisciplinary research that spans across the University's schools, faculties, and institutes, underpinning specialized initiatives such as Addressing Global Inequalities, Advanced Materials, and Energy. Connections are further strengthened through our involvement with several research institutes and centres, including the Modelling & Simulation Centre, the Centre for Robotics and AI, the Tyndall Centre for Climate Change Research, the Dalton Nuclear Institute, the Institute for Data Science and Artificial Intelligence, and the Christabel Pankhurst Institute for health technology research and innovation.

For more information, please see below:
https://www.mace.manchester.ac.uk/msc/about/
https://www.robotics.manchester.ac.uk/
https://www.tyndall.manchester.ac.uk/
https://www.dalton.manchester.ac.uk/
https://www.idsai.manchester.ac.uk/
https://www.pankhurst.manchester.ac.uk/

A recent UKRI report on Tomorrow's Engineering Research Challenges highlighted 'Faster Digital Design' as a critical unmet challenge in today's society and industry. Digital twins, which are virtual models that accurately mirror physical objects, processes, or systems, are increasingly utilized to enhance system performance, pre-emptively address problems, enable accelerated design, and streamline processes. Fluids simulation often remains the bottleneck in such models, underscoring the pressing need for research into cost-effective yet accurate methods.

We are seeking excellent candidates who aspire to become global leaders in Fluids Simulation and Digital Twins, with a passion to make substantial contribution to exciting delivery and syllabus development at undergraduate and postgraduate level. In particular we invite applications from candidates with substantial experience in one or more of the following areas of research:
Development and application of reduced-order models, via machine learning/AI and other data science methods within the context of fluid dynamics and digital twins.

Development of fluids simulation strategies tailored to clean energy; including technology for hydrogen and other sustainable fuels; combustion dynamics; super/hypersonic flows.
Enhancement of particle-based methods like Smoothed Particle Hydrodynamics (SPH) applied to multiphase flows and natural hazards.

Application and development of advanced numerical methods for simulating turbulent flow and multi-physics to high orders of accuracy, e.g. flux reconstruction, discontinuous Galerkin and spectral difference methods.

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Key Responsibilities, Accountabilities or Duties:

Overall Purpose of Role

The role holder will develop research and teaching in research areas relating to fluids simulation and digital twin technology. This will entail collaboration with colleagues within the School and across the wider University, as well as more broadly with industrial and international collaborators and stakeholders, to develop a portfolio of cutting edge disciplinary or interdisciplinary research activity. The appointee will lead on the delivery and development of teaching on fundamental topics and topics related to fluid mechanics and computational engineering for either disciplinary or interdisciplinary programmes in the School with opportunities to also contribute to cross-University programmes.

Main Responsibilities

- Securing funding from research councils and other relevant sources such as industry and non-government bodies to support research activity and researchers.
- Development and delivery of internationally excellent research in the area of fluid mechanics and/or digital twins.
- Supervision of postgraduate research students and researchers.
- Publication of research in leading journals and presentation at international conferences and in other fora relevant to stakeholders and end-users of the research.
- Undertaking teaching duties (including but not limited to assessment, academic advising and project supervision) within the University on undergraduate and postgraduate courses. This may include topics core to the discipline or aligned with research activity or with wider interdisciplinary scope.
- Contribution to relevant service duties, commensurate with the level of appointment, to support efficient operation of the organisation.
- Engagement with relevant committees within the School and/or the University.
- Embedding social responsibility and environmental sustainability within teaching and research practice.

Person Specification

Essential Knowledge, Skills and Experience:

- Educated to PhD level or equivalent in an appropriate topic.
- Demonstrate capability to conduct outstanding research in the engineering simulation of fluids and/or experience in the development and application of data science techniques for engineering simulation and digital twin technology.
- A developing trajectory track record of research output in internationally leading journal publications or other equivalent recognised forms of research output.
- Capability for establishing links with industry and other academic researchers, generating funding streams from research councils, European Commission and industry.
- Good communication skills and an ability to foster interdisciplinary collaboration.
- Good management and teamwork skills.

- Ability to lecture to large classes and supervise group and individual projects at Masters and undergraduate level.
- Membership, or intention to become a Member, of an appropriate Professional Institution (e.g. IEEE, IMechE, RAeS, IET, ICE, etc).
- Commitment to taking responsibility for the health and safety of others, including the development and implementation of risk assessments.
- Commitment to contributing improvements to advance our inclusive, equal and fair working environment.

The University of Manchester

The University of Manchester (www.manchester.ac.uk) enjoys a global reputation for its research and its innovative approach to learning, with a £1 billion investment in facilities, staff and new buildings across the campus, including new Engineering Buildings that fully opened in 2022. The University's current rankings place us among the world's best universities. This builds on our tradition of success that stretches back nearly 200 years. The birth of the modern computer, the splitting of the atom, the founding principles of modern economics, the discovery of graphene, and the birthplace of chemical engineering – these and many more world changing innovations have their roots at our University. We are at the forefront of the search for solutions to some of the world's most pressing challenges, with strong collaborative links with industry and public services.

As one of the world's leading research institutions and the UK's only university to have social responsibility as a core goal, The University of Manchester is playing a leading role in tackling the SDGs in four ways – through our research, learning and students, public engagement activities and responsible campus operations. We're the only university in the world to rank in the top ten for social and environmental impact in every year of the Times Higher Education Impact Rankings. We're also ranked number one in the UK and Europe, and third in the world, in the QS World University Sustainability Rankings, for our environmental, social and governance impact.

The University actively fosters a culture of inclusion and diversity and seeks to achieve true equality of opportunity for all members of its community. The Faculty welcomes applications from all sections of the community and are committed to having a representative workforce. Across the Schools we hold Bronze and Silver Athena SWAN Awards, which recognise our commitment to equality, diversity and inclusion and particularly the advancement of women's careers in STEM.

The University also holds a Bronze Race Charter Mark recognising our commitment to improving the representation, progression and success of minority ethnic staff and students within higher education. In addition, we are a Disability Confident Employer, guaranteeing an interview for any disabled applicant who meets the minimum requirements for a job.