UNIVERSITY OF LEEDS

CANDIDATE BRIEF

Summer Research Internship – Future Fluid Dynamics CDT

Faculty of Engineering and Physical Sciences

Salary: Grade 4 (£26,707 - £28,778 p.a.)

Reporting to: Dr Masoud Jabbari, School of Mechanical Engineering

Reference: EPSMA1138

Closing date: Monday 01 June 2026

Fixed term (between 6-12 weeks, available from 01 June 2026 - to complete specific time limited work)

Location: Leeds Main Campus

We are open to discussing flexible working arrangements

Summer Research Internship - Future Fluid Dynamics CDT, Faculty of Engineering and Physical Sciences.

Are you interested in gaining first-hand experience of the research environment in fluid dynamics at the University of Leeds? Would you like to explore this opportunity to help you make an informed decision about progressing to postgraduate research? Would you like to develop knowledge, skills and experience to strengthen your application for research degree opportunities?

The EPSRC Centre for Doctoral Training (CDT) in Future Fluid Dynamics, hosts an annual internship programme throughout summer. This opportunity is designed to enhance access to postgraduate research for individuals from underrepresented groups, supporting a more diverse and inclusive research community.

The programme allows prospective postgraduate researchers to gain first-hand experience of the research environment in fluid dynamics at the University of Leeds. This experience will assist them to help informed decisions around progression to PGR and to develop relevant knowledge, skills and experience that can strengthen their applications to research degree opportunities. The centre provides advanced training and research opportunities in the field of fluid dynamics, with the aim of equipping future academics and industry practitioners with the interdisciplinary skills required to tackle complex fluid-related challenges across a range of industrial and scientific sectors. Research areas are Engineering and Physical Sciences, Environment, Biological Sciences, or Medicine and Health.

Widening participation

Applications are open to those who have *not* undertaken a research internship previously, and meet one or more of the following criteria:

- The first in their family to go to university;
- From Black, Asian or other minoritised ethnic groups;
- Neurodivergent (e.g. ASD, ADHD) and/or Disability (e.g. physical impairments, mental health condition, learning difficulties, chronic illness);
- Are female;
- Have caring responsibilities;
- Have been outside of education for 5 or more years;

- Studying/studied at a university that is not a member of the Russell Group.

About the project

Title: Modelling flow and particle interaction in binder jetting additive manufacturing

Binder jetting is a powder-based additive manufacturing (AM) process in which droplets of liquid binder are selectively deposited onto a powder bed to create solidified structures. The interaction between the impacting binder droplets and the powder particles plays a critical role in defining part density, dimensional accuracy, and overall print quality. However, this interaction is governed by a complex interplay of fluid flow, capillary forces, and particle-scale mechanics that remain insufficiently understood.

This internship project focuses on the computational modelling of binder droplet impact, infiltration, and spreading within a powder bed, with particular emphasis on how jetting process conditions (droplet velocity, size, frequency) and particle surface properties (surface tension, wettability, and surface roughness) influence the resulting wetting behaviour. The student will explore how variations in these parameters affect binder penetration depth and infiltration length.

The project will involve building and analysing numerical flow models to simulate droplet-particle interactions at relevant time and length scales. Key phenomena include droplet deformation on impact and capillary-driven flow within inter-particle pores. The outcomes will help identify the dominant physical mechanisms controlling binder distribution and offer insights into how process optimisation or powder modification (e.g., surface treatment) can improve print quality.

By the end of the project, the student will deliver visualisations of simulated droplet impact events, parameter-sensitivity analyses, and recommendations for optimal jetting and material conditions. This work will contribute to a deeper mechanistic understanding of binder jetting and support the development of more predictive and reliable manufacturing processes.

Overview of the role

To undertake independent research project supervised by an academic at the University of Leeds. This project will take place over 210 hours worked over a period of 6 weeks to 3 months during summer.

Main Duties and responsibilities

- Reviewing relevant literature in modelling binder jetting AM;
- Simulating binder-particle wetting;
- Writing a short report summarising model implementation and results.

These duties provide a framework for the role and should not be regarded as a definitive list. Other reasonable duties may be required consistent with the grade of the post.

Developmental benefits

- Hands-on experience with advanced computational modelling, including CFD, used widely in academia and industry;
- Learn about multiphase flow and wetting behaviour, enhancing core engineering and scientific knowledge;
- Improved programming and data-analysis skills, through simulation setup, parameter studies, and post-processing;
- Gain knowledge of binder jet AM process and its importance in future technologies;
- Development of independent research and problem-solving abilities, including designing simulation strategies and interpreting complex results;
- Experience of communicating technical findings, through written reports, presentations, and visualisation of simulation outputs that is valuable for both academic and industrial careers.

Qualifications and skills

Qualifications

- Open to graduates and current second- or third-year undergraduates eligible for the Home (UK) fee-rate at postgraduate research (PGR).

Essential

- Curiosity and willingness to learn skills and techniques;
- Critical thinking;
- Good verbal and written communication skills;
- Ability to work both independently and as part of a team;
- Project specific:
    - Background in engineering, physical science, materials science, or a related discipline;
    - Knowledge and interest in fluid mechanics;
    - Basic experience with numerical modelling or simulation tools, such as Matlab, Python, Ansys, Comsol, or similar;
    - Strong analytical and problem-solving skills, with the ability to interpret physical processes using mathematical or computational approaches;
    - Ability to manage and organise work independently, including planning simulations and documenting results clearly.

Desirable

- Project specific:
    - Familiarity with CFD modelling approaches, particularly for multiphase flows;
    - Experience in using simulation environments such as Ansys Fluent, Comsol, OpenFOAM, or similar computational tools;
    - Programming experience (e.g., Python, C++, or Matlab) for post-processing, automation, or data analysis;
    - Interest in additive manufacturing technologies, especially binder jetting or powder-based 3D printing processes.

How to apply

You can apply for this role online; more guidance can be found on our How to Apply information page. Applications should be submitted by **23:59** (UK time) on the advertised closing date.

Please upload a supporting statement (Word or PDF) with the following details:

- An **introduction** to yourself and a **brief overview** of why you are applying for your chosen project and the internship;


- An outline demonstrating how you meet all **essential** and **desirable criteria** in the job description. Please address each criterion separately, clearly referencing the specific criterion;
- A description of which **widening participation criteria** mentioned in the job description you satisfy.

Contact information

To explore the post further or for any queries you may have, please contact:

Dr Masoud Jabbari, Assistant Professor in Advanced Materials Processing & Simulation
Email: M.Jabbari@leeds.ac.uk

OR

Patricia Grant, Centre Manager
Email: P.Grant@leeds.ac.uk

Additional information

Faculty and School Information
Further information is available on the research and teaching activities of the Faculty of Engineering & Physical Sciences, and the School of Mathematics.

Working at Leeds
We are a campus-based community and regular interaction with campus is an expectation of all roles in line with academic and service needs and the requirements of the role. We are also open to discussing flexible working arrangements. To find out more about the benefits of working at the University and what it is like to live and work in the Leeds area visit our Working at Leeds information page.

A diverse workforce
As an international research-intensive university, we welcome students and staff from all walks of life and from across the world. We foster an inclusive environment where all can flourish and prosper, and we are proud of our strong commitment to student education. Within the Faculty of Engineering and Physical Sciences we are dedicated

to diversifying our community and we welcome the unique contributions that individuals can bring, and particularly encourage applications from, but not limited to Black, Asian and ethnically diverse people; people who identify as LGBT+; and people with disabilities. Candidates will always be selected based on merit and ability.

We have identified that women are currently underrepresented in this role and particularly welcome applications. Candidates will always be selected based on merit and ability.

The Faculty of Engineering and Physical Sciences are proud to have been awarded the Athena SWAN Silver Award from the Equality Challenge Unit, the national body that promotes equality in the higher education sector. Our equality and inclusion webpage provides more information.

Information for disabled candidates
Information for disabled candidates, impairments or health conditions, including requesting alternative formats, can be found under the 'Accessibility' heading on our How to Apply information page or by getting in touch by emailing HR via hr@leeds.ac.uk.

Criminal Record Information
Rehabilitation of Offenders Act 1974
A criminal record check is not required for this position. However, all applicants will be required to declare if they have any 'unspent' criminal offences, including those pending.

Any offer of appointment will be in accordance with our Criminal Records policy. You can find out more about required checks and declarations in our Criminal Records information page.