Dylan Rubini

Mechanical Engineer

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▬▬▬ Professional Positions

Oct. 24–Now **Postdoctoral Fellow in Computational Multiphysics**, *University of Oxford*.

- *Projects*:
    1. Commercialisation of machine-learning-accelerated platform for modelling aerochemical-catalytic interactions in novel turbomachinery environments.

    2. *Collaboration:* Computational multiphysics modelling of multiscale nanomembrane transport phenomena within CO_2 capture systems.

    3. *Collaboration:* Automating engineering simulation & design using multi-agent large language model systems.

▬▬▬ Education and Research

2020–2024 **PhD in Engineering Science (Scholarship)**, *University of Oxford Thermofluids*.

- *Overall:* Contributed to the aerothermal design, computational modelling and tool development for a new class of supersonic turbomachines to decarbonise over 40 high-temperature industrial processes.

- *Part (A)*:
    1. Developed multi-fidelity machine-learning-assisted platform to accelerate multiphysics reacting flow modelling within industry-standard fluid solvers.

    2. Implemented and executed *chemical-reaction-guided* turbomachinery design optimisation for the first time.

- *Part (B)*:
    1. Investigated the uniquely complex aerothermochemical flow interactions and heat transfer using high-fidelity simulations.

    2. Developed fully-featured multi-zone unstructured computational fluid dynamics solver for CPU & GPU backends.

2016–2020 **MEng in Engineering Science, First Class ($>$80%)**, *University of Oxford*.

- *Final Year Thesis*: first numerical work to understand the working principles of a new class of supersonic turbomachines to decarbonise high-temperature industry.

- *Achievements*: top mark in cohort for 4th year project (**93%**) and scored $>$**80%** overall.

- 3rd-year Advanced Courses: Fluid Mechanics (Turbulence, Compressible Flow & Turbomachinery), Software Engineering, Information Engineering Systems, Electronic Devices, and Circuits & Communications.

- 4th-year Advanced Courses: Aerothermal Engineering, Electrochemical Energy Technology, Hydraulics, Sustainable Energy, Machine Learning, Microelectronics.

2008–2016 **A-Levels**, *A*A*A*, **GCSEs** *8A*s, 4As*.

Awards and Achievements

2024 **ASME J. Davis Best Paper Award**, *International Gas Turbine Institute*.
2024 **Letter of commendation for PhD thesis**, *Oxford Engineering Dept*.
2024–Now **Drapers Junior Research Fellowship**, *St Anne's College (Oxford)*.
2024–Now **Awarded competitive IAA Doctoral Impact Prize**, *University of Oxford*.
2023–2025 **Awarded 20k computing research grant**, *UKRI ARCHER2 HPC access*.
2023 **Best Paper Award**, *Journal of Global Power & Propulsion Society*.
2020–2024 **Doctoral Scholarship**, *UKRI DTP EPSRC*.
2020 **Prestigious IMechE Project Award**, *Institution of Mechanical Engineers*.
2020 **Top mark in 4th year MEng project (93%)**, *Oxford Engineering Dept*.
2018–2020 **Academic prize awards**, *Oriel College, University of Oxford*.

Industry Experience

Autumn 2024 **Mitsubishi Heavy Industries**, *Japan*, 2 Month Placement.
- Predicting high-temperature corrosion in ammonia-fired boilers through coupled chemical thermodynamics, combustion & surface reaction modelling.

2019–2024 **Coolbrook Oy**, *Finland*, Collaborator.
- Collaborated on designing, modelling and developing tools for complex aerothermochemical flows within a new class of high-speed turbomachines for gas heating.

Summer 2017 **GNL Quintero**, *Chile*, Intern.
- Investigated failures in liquefied natural gas piping systems.

Research Experience and Teaching

Summer 2019 **Research Intern**, *Oxford Thermofluids Institute*.
MPI parallelisation of our in-house computational fluid dynamics solver.

Summer 2018 **Research Intern**, *Oxford Thermofluids Institute*.
Design of instrumentation systems within a new wind tunnel.

University Teaching

Winter 2025 Teaching 2nd year engineering mathematics and thermofluids.
Winter 2025 Teaching 2nd year heat transfer lab.

PhD Student Supervision

2023–Present	Accelerating multiscale numerical modelling
2024–Present	Advanced compact heat exchanger design

Publications and Talks

2020–2024	**Publications**, 7 journal publications (dylanrubini.github.io).
2020–2024	**Talks**, 7 talks at conferences, universities & industry.

Technical Skills

Languages 1	*Expert:* Python, Fortran, Matlab, MPI programming, Domain Specific Languages (*e.g.,* OP2), Shell scripting, LaTeX
Languages 2	*Familiar:* C/C++, Cuda, OpenMP programming
ML libraries	TensorFlow, Pymoo (optimisation), agentic LLM libs (*e.g.,* LangChain)

Software

Fluids	Ansys (multiphysics), BoxerMesh (meshing), Icem (meshing), in-house code Tblock (CFD), Lattice Boltzmann OpenLB (CFD), SolidWorks CAD, ParaView (post-processing)
Chemistry	Rmg-Py (generating micro-kinetic models), Cantera (solving kinetics)
General	Git, Visual Studio Code, Sublime Text, CorelDraw, Inkscape, Overleaf
HPC Facilities	ARCHER2, Advanced Research Computing Facility (Oxford)
OS	Linux (Ubuntu & CentOS), macOS, Windows

Certified Courses

OpenLB	Developed custom lattice Boltzmann PDE solvers

Referees

Available upon request