Dylan Rubini

AI4Science Research Engineer

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About Me

"*AI4Science Research Engineer specialising in AI-accelerated computational modelling & optimisation. Passionate about developing advanced fast solutions to solve high-impact, complex, & multidisciplinary engineering challenges in aerospace & energy.*"

Professional Positions

2025-Now **AI–Simulation Research Engineer**, *Emmi AI*.

- Developing AI-accelerated neural surrogates for physics simulations.

2024-2025 **Postdoc in Machine Learning for Multiphysics**, *University of Oxford*.

- *Selected Projects*:
  1. Leading the design, modelling, and AI surrogate development for a novel turbomachinery reactor integrated with 3D-printed *catalytic* structures.
  2. Leading the modelling of a nanomembrane system for CO_2 capture.
  3. Building digital twins & ML surrogate models for aerospace/thermal systems.
  4. Developing agentic LLMs to automate scientific/engineering workflows.

Research and Education

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

- *Big Picture:* Led aerothermal optimisation, modelling, & tool building for a new class of supersonic turbomachines for very high-temperature reactive gas heating.

- *Relevant Components*:
  1. Developed multi-fidelity machine-learning-accelerated surrogate called `ChemZIP` to accelerate reacting flow modelling by $\underline{100\times}$.
  2. Developed novel *chemistry-guided* design genetic optimisers.
  3. Led first high-fidelity multiphysics modelling investigations.
  4. Developed U-TBLOCK – a fully-featured, unstructured computational fluid dynamics solver for GPUs/CPUs at HPC scale using code generation.

2016–2020 **MEng in Engineering Science, 1$^{\text{st}}$ Class (>80%)**, *University of Oxford*.

- *Achievements*: **Top** masters thesis in cohort (**93%**) and scored >**80%** overall.

- ○ *Selected Advanced Courses:* Aerothermal Engineering I+II, Machine Learning I+II, Electrochemistry, Software Engineering, Sustainable Energy, Hydraulics.

Awards

2023–2024	**2x Best Paper Awards**, *Mechanical (ASME) & Propulsion (GPPS).*
2024	**IAA Doctoral Impact Prize**, *EPSRC – UK Research and Innovation.*
2024–Present	**Drapers Research Fellowship**, *St Anne's College.*
2024	**Special Commendation for PhD Thesis**, *Oxford Engineering Dept.*
2023–2024	**20k HPC Computing Grant**, *UKRI ARCHER2 access.*
2020	**IMechE Project Award**, *Institution of Mechanical Engineers.*

Industry Experience

Autumn 2024	**Mitsubishi Heavy Industries**, *Japan*, Placement.
	○ Developed tools to predict high-temperature corrosion rates in ammonia-fired boilers through coupled combustion, surface chemistry, and materials modelling.
2019–2024	**Coolbrook Oy**, *Finland*, Industrial Partner.
	○ Collaborated on designing, modelling and developing tools for a new class of high-speed turbomachines for high-temperature gas heating.

Technical Skills

Languages 1	***Expert:*** Python, Fortran, Matlab, MPI programming, Domain Specific Languages (DSL, *e.g.,* OP2), Bash scripting, Git versioning, Slurm, LaTeX
Languages 2	***Familiar:*** C/C++, Cuda, OpenMP programming, Docker containers
ML libraries	TensorFlow, Pymoo (optimisation), agentic LLMs (*e.g.,* LangChain)
Sci-Libs	Numpy, Pandas, SciPy, Rmg-Py, Cantera

Software

Multiphysics	Ansys (multiphysics), OpenFOAM (multiphysics), Boxer + Icem (meshing), Tblock (CFD), OpenLB (CFD), SolidWorks (CAD), ParaView (post-proces.)

Publications and Talks

2020–Present	**Publications**, 7x journal publications (https://dylanrubini.github.io/).
2020–Present	**Talks**, 12x talks at global conferences, universities & industrial partners.
2025–Present	**Societies**, Founded cross-disciplinary Oxford Numerical Modelling Society.

Leadership and Teaching

PhD Supervision

2024–Present	Designing compact, TPMS 3D–printed heat exchangers with topology optimisation.
2024–Present	Accelerating multiscale numerical modelling for repeating structures.

Undergraduate Teaching

2024–2025   2$^{\text{nd}}$ year partial differential equations, linear algebra, heat transfer, & fluid dynamics.

Certified Courses

OPENLB   Developed custom lattice Boltzmann PDE solvers.