RUI ZHAO

Gender: Male / Date of Birth: 26th October 1998

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EDUCATION

University College London, **Department of Mechanical Engineering** 09/2020 - 09/2021

Major: Power Systems Engineering **GPA & Awards**: 82.72%, Distinction (**Dean's List, Ranked 2nd**)

Professional Courses: *Electrical Machines and Power Electronic Drives (91%), New and Renewable Energy Systems (88%), Power Transmission and Auxiliary Machinery Systems (87%), Electrical Power Systems and Electrical Propulsion (86%), etc.*

China University of Mining and Technology, School of Electrical and Power Engineering 09/2016 - 06/2020

Major: Energy and Power Engineering **GPA:** 86.28% (Top 10)

Professional Courses: *Energy Management Foundation (100%), Numerical Simulation of Fluid Dynamics and Heat Transfer (92%), Combustion Theory (92%), Design of Heat Exchanger (92%), Heat Transfer (91%), Heating Engineering (90%), etc.*

PUBLICATIONS

- Jiying Chen, Rui Zhao, Kai H. Luo*, Cycle Power and Efficiency Modelling of Stirling Engines based on Modified Second-order Adiabatic Analysis and Improved Atom Search Integrated Back-propagation Neural Network, *Applied Energy.* (ICAE2021, Accepted for Publication)
- Jiying Chen, Zedong Chu, Rui Zhao, Alexander F. Luo, Kai H. Luo, Output Prediction of Alpha-type Stirling Engines using Gradient Boosted Regression Trees and Corresponding Heat Recovery System Optimisation Based on Improved NSGA-II, *Energy Report*. 2022, 8: 835-846.
- Yuxing Wang, Cong Qi*, Rui Zhao, Chengchao Wang, Study on the mechanism of modified surface and magnetic nanofluids on cooling performance of wireless charging equipment under magnetic field, *Applied Thermal Engineering*, 2022, 208, 118258.
- Yuxing Wang, Cong Qi*, Zi Ding, Jianglin Tu, Rui Zhao, Numerical simulation of flow and heat transfer characteristics of nanofluids in built-in porous twisted tape tube. *Powder Technology*, 2021, 392: 570-586.

RESEARCH EXPERIENCES

Master's Research Project | Large Eddy Simulation (LES) of a Gas Turbine Combustor for Aircraft Propulsion

04/2021 - 09/2021

Supervisor: Professor Kai H. Luo, Fellow of the Royal Academy of Engineering, University College London

- Applied LES technologies to simulate the reactive and non-reactive flows in a realistic combustor.
- Established a comprehensive evaluation system that considers performance parameters, including OTDF, NO_x emissions, etc., which is able to evaluate the overall performance of the combustor.
- Systematically analysed the effects of the equivalence ratio and the combustor length on the combustion field and the performance of the combustor. Suggestions to further improve combustor performance were also proposed based upon the results.
- Received **83.85** overall marks on the thesis, which was highly recommended for publishing by supervisor Professor Kai H. Luo and other reviewers.

Master's Group Project | Design of an LTD Stirling Engine Utilising Waste Heat from Supercomputers

04/2021 - 09/2021

- A CFD model was applied to simulate the operation of the LTD Stirling engine. Dynamic mesh and adaptive mesh refinement were executed to simulate the displacer movement and improve accuracy.
- A new Stirling engine forecasting model utilising Gradient Boosted Regression Trees (GBRT) was constructed to predict the output power of Alpha-type Stirling engines, which resulted in overall prediction accuracy of 96.23%.

- Proposed an improved atom search optimisation algorithm (IASO) retooled by elite opposition-based learning and dimensional Gaussian mutation, resulting in the simultaneous prediction of power and efficiency accuracy of 95%.
- Publication:

Master's Group Project | Design of an All-Electric Aircraft

04/2021 - 09/2021

- Proposed a solar hydrogen integrated power system, established the relevant mathematical model, and derived the mapping relationship between system weight and critical dimensional parameters.
- The various dimensional parameters of the aircraft (cabin length, wing parameters, etc.) were calculated according to the design objectives, which subsequently determined the specific structure of the aircraft.

Bachelor's Research Project | Numerical Simulation of Flow and Heat Transfer Characteristics of Nanofluids in Built-in Porous Twisted Tape Tubes   11/2019 - 06/2020

Supervisor: Cong Qi, Associate Professor of the School of Electrical and Power Engineering, CUMT

- Analysed the effects of tube structure (round and triangular tubes), hole spacing, and hole shape (round, square and triangular holes) on the flow and heat exchange characteristics of SiO_2-H_2O nanofluids in the tube via numerical simulation. Simulated a total of 144 working conditions.
- Received grade **A** and was awarded *the outstanding thesis* accolade.

Researcher | Jiangsu Province Engineering Laboratory of Highly Efficient Energy Storage Technology and Equipment

11/2017 - 06/2020

- Finished 3 academic projects: ① Design of an Engine Power System for the FSC (National College Student Innovation and Entrepreneurship Training Program). ② Design and Experimental Analysis of a Heat Exchanger System with Micro-ribbed Tube. ③ The study on the mechanism of modified surface and magnetic nanofluids on the cooling performance of wireless charging devices under a magnetic field.
- Systematically studied the properties of various nanofluids and PCMs, engine working principles, advanced enhanced heat transfer technologies, numerical simulation, 3D modelling, academic graphing, and academic writing.
- Independently mastered the experimental procedures, further developing my independent research capabilities.

WORK EXPERIENCES

CAE Technical Support Engineer | National Supercomputing Centre in Wuxi

10/2021 - present

- Responsible for solving simulation-related problems and providing high-performance computing resources for clients.
- Effectively familiarised me with various simulation software such as Converge, Star-CCM+, LS-DYNA, etc., and learned how to conduct parallel computing on HPC.

SELECTED HONORS AND AWARDS

- Dean's List of the Department of Mechanical Engineering, UCL — 12/2021
- National Scholarship & Outstanding Student Cadre in the 2018-2019 academic year — 11/2019
- Shanghai Energy Scholarship — 11/2019
- Foreign Language Scholarship — 11/2019
- First Prize of the China Robot Competition — 08/2019
- "Excellent Student Cadre" of Jiangsu Province — 05/2019
- Meritorious Winner of 2018 Mathematical Modeling Contest — 04/2018
- National Scholarship & Outstanding Student in the 2016-2017 academic year — 11/2017

ADDITION SKILLS

Software: Fluent, OpenFOAM, Mechanical APDL, MATLAB, COMSOL, Star-CCM+, CFD-ACE+, SolidWorks.

Skills: Can independently write simple CFD and FEA code; Proficient in the pre-processing and post-processing of CFD.