Dr Yang Wang

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Interests

- Energy (generation, storage, and utilisation) system modelling and optimisation
- Engineering simulation/computation and optimisation
- Data-driven modelling and machine learning

Skills

- Multi-scale and multi-physics modelling
- Numerical methods for Partial Differential Equations: algorithms, discretisation schemes and linear solvers
- Numerical optimisation: stochastic and deterministic methods
- Python, MATLAB/SIMULINK, Fortran and C++ programming
- Version control tools (SVN, Git and Mercurial) and agile project management tool (Pivotal Tracker)
- Tools/software: PyPSA, Aspen Plus, GMSH, ICEM, ParaView, OpenFOAM and Fluent
- Linux operation systems, Shell script, Vim, Meld, Make, Doxygen, Gprof, and HYPRE open source libraries
- MS Office tools (e.g. Word, Excel and PowerPoint), Texmaker (editor for LaTeX), etc.

Education

- 2012 - 2016 PhD in Mechanical Engineering, Queen Mary, University of London, United Kingdom
- 2009 - 2012 MSc in Power Engineering and Thermophysics, Xi'an Jiaotong University, China
- 2005 - 2009 BEng in Energy and Power Engineering, Xi'an Jiaotong University, China

Work/Research Experience

- 2019. 10 - present CFD Software Engineer at Advanced Design Technology, London, United Kingdom
  - ➢ High performance CFD optimisation software development
- 2018. 12 - 2019. 9 Flight Data Analyst at Altaeros, Somerville, Massachusetts, United States
  - ➢ Processing and analysing day-to-day flight and telecom field test data and work with the mechanical, electrical, control teams to optimise the design of aerostats
  - ➢ Developing automatic data processing/analysing tools and maintaining codebase and improving robustness
- 2017. 11 - 2018. 12 Parenting and working from home during relocation, Cambridge, USA
  - ➢ Machine Learning taught by Stanford University on Coursera
- 2017. 3 - 2017. 10 Research fellow on projects funded by Engineering and Physical Science Research Council (EPSRC), School of Engineering, University of Warwick, Coventry, United Kingdom
  - ➢ *Next Generation Grid Scale Thermal Energy Storage Technologies*:
    - ∗ Developed a MATLAB/SIMULINK toolbox with the team for designing, controlling and optimising grid-scale energy storage and integrated energy system, such as compressed air energy storage, battery storage, and thermal energy storage
    - ∗ Applied the models for an optimal design of packed bed thermal energy storage that increases the system cycle efficiency by ∼10%, achieved by optimising the storage materials in the heat storage
  - ➢ *Ultra-Supercritical (USC) steam power generation technology with Circulating Fluidized Bed (CFB): Combustion, Materials and Modelling*:
    - ∗ Developed a zone-based dynamic model (in Fortran module compatible with Aspen+) to accurately predict CFD boiler energy distribution with consideration of coupling heat exchange between the free board and the water-wall, validated the model and simulated industrial-scale CFB boiler with parameters collected from industrial partners and Tsinghua University
- 2012. 9 - 2017. 1 PhD candidate, working on the project *About Flow* funded by the European commission
  - ➢ Led the development team of in-house CFD codes (in Fortran) for incompressible flow with discrete adjoint sensitivity/gradient solvers using Automatic Differentiation

    - Improved solver performance: increased solution accuracy with residuals reduced by 1 order of magnitude and reduced CPU time by ∼60% in a run of both flow and gradient computation (tested on PCs and the HPC cluster)
    - Increased the solver robustness for wider applications and compatibility with other post-processing tools
  - ➢ CAD-based shape optimization of the S-bend air duct in Volkswagen Golf vehicle for reducing pressure drop by ∼20%
  - ➢ Node-based shape optimisation of the filaments in membrane channels for reducing pressure drop and increasing mass transfer rate
    - Developed and implemented numerical models for Pressure Retarded Osmosis (PRO) and Reverse Osmosis (RO) membrane process (in OpenFOAM and Fortran codes)
    - Firstly analysed filament surface sensitivities obtained from discrete adjoint computation
    - Designed/Optimised the spacer shape (in Fortran and Shell script) and achieved pressure/energy loss reduction by ∼25% with negligible mass transfer loss
    - Developed a membrane model library (in MATLAB) for simulating the flow and mass transfer of water and salts for system design of solar powered desalination
- 2009. 9 - 2012. 7 Postgraduate researcher at School of Energy and Power Engineering, Xi'an Jiaotong University, China
  - ➢ Spectral element method for acoustic propagation problem in non-uniform flows
    - Studied Spectral Element Method, the combination of Finite Element and Spectral methods for high-accuracy, multi-scale flow and acoustic coupling computation
    - Derived the mathematical description of acoustic propagation in non-uniform flow
    - Implemented the equation and a high accuracy scheme on the absorbing boundary conditions (in C++)
- 2008. 9 - 2009. 6 Undergraduate research project: the design of high flow rate vortex/generative blower
  - ➢ Impeller design based on empirical correlations in literature and 3D model via software ProE

Selected Publications

Please visit `webpage` for my publications.

Awards and grants

- 2015 Postgraduate Research Fund (Queen Mary University of London)
- 2014 Postgraduate student grant (School of Engineering and Material Science, QMUL)
- 2012 Best Postgraduates (Top 10%)
- 2010 Outstanding Postgraduate Student Award (Top 15%)
- 2009 Postgraduate Innovation Fund Scholarship (1st Class, 2/46)
- 2009 Best Graduates (Top 10%)
- 2008 *Fusheng* Industrial Scholarship (1st Class, Top 15%)

Teaching and supervising experiences

- 2012 - 2015 Teaching and demonstrating in undergraduate courses:
  - ➢ Heat Transfer and Fluid Mechanics: coursework tutorial
  - ➢ Mechanics of Fluids: lab demonstration and reports marking
  - ➢ Computer Aided Engineering in Fluids and Solids: OpenFOAM tutorial
- 2012 - 2015 Leader of the segregated flow solver development team:
  - ➢ Mentoring junior researchers with code review and implementation
- 2009 - 2012 Instructor in Department of Fluid Machinery