

# Yang Wang

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## Research Interests

- Scientific computation and multi-physics modelling
- Computational Fluid Dynamics in multi-disciplinary applications
- CAD/Node-based shape deformation and gradient-based optimisation
- Energy technology and system simulation

## Skills

- Numerical methods for Partial Differential Equations: algorithms, discretisation schemes and linear solvers
- Finite Volume Method and Spectral Element Method (Finite Element Method + Spectral Method)
- Numerical optimisation: stochastic and deterministic methods
- Fortran, MATLAB/Octave and C++ programming
- Chemical Engineering process/system simulation tool: Aspen Plus
- Tools/software: SolidWorks, ProE, GMSH, ICEM, ParaView, OpenFOAM, Fluent
- Automatic Differentiation (AD) tool TAPENADE
- Linux operation systems, Vim, Meld, Make, Git, Doxygen, Gprof, and HYPRE open source libraries

## Education

- 2012. 9 - 2017. 1 PhD in Mechanical Engineering, Queen Mary, University of London, United Kingdom
- 2009. 9 - 2012. 6 MSc in Power Engineering and Thermophysics, Xi'an Jiaotong University, China
- 2005. 9 - 2009. 7 BEng in Energy and Power Engineering, Xi'an Jiaotong University, China

## Academic experience

- 2017. 11 - present Parenting and working from home during relocation, Cambridge, USA
  - Multi-physics modelling and computation strategies
  - Machine Learning by Stanford University on Coursera
  - Journal papers writing and revision; paper reviewing work invited by journal editors
- 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: Novel system design for Compressed Air Energy Storage (CAES) coupled with Reverse Osmosis (RO) water producing process
  - Ultra-Supercritical (USC) steam power generation technology with Circulating Fluidized Bed (CFB): Combustion, Materials and Modelling: Heat transfer numerical model of CFB boiler integrated with water-wall heat exchange
- 2012. 9 - 2017. 1 PhD candidate, working on the project *About Flow* funded by the European commission
  - Development of integrated CFD and discrete adjoint sensitivity/gradient solvers
  - SIMPLE-like algorithms vs. Pressure Schur Complement (PSC) method theatrical derivation
  - In-house CAD (NsPCC: NURBS-based parametrisation with continuity constraints) gradient calculation for the 3D model of S-bend air duct in Volkswagen Golf vehicle
  - CAD-based shape optimization with mesh deformation based on linear elasticity theory
  - Fluid dynamics analysis on air duct shape optimisation cases in Volkswagen Golf vehicle
  - Membrane process modelling and governing equations implementation
  - Fluid dynamics analysis and filaments surface sensitivity analysis

- Spacer shape design via gradient-based optimisation using discrete adjoint sensitivity
- 2009. 9 - 2012. 7 Postgraduate researcher working on spectral element method for acoustic propagation problem in non-uniform flows
  - The numerical model derivation of acoustic propagation in non-uniform flow
  - Implementation of group velocity method with high accuracy on the absorbing boundary conditions
- 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

1. Y. Wang and J.-D. Müller. Re-visit SIMPLE-like algorithms via Pressure Schur Complement for stabilisation of discrete adjoint solver with industrial incompressible flow application. In preparation
2. Y. Wang, W. He, and J.-D. Müller. Sensitivity analysis of feed spacer shape in reverse osmosis membrane process using discrete adjoint approach. *Desalination*, 2018. Accepted
3. Y. Wang, W. He, and J. Wang. Pumped seawater combined with Compressed Air Energy Storage: an integrated co-storing/producing energy/water system. *Applied Energy*. Under revision
4. Y. Wang, W. He, and H. Zhu. Computational fluid dynamics (CFD) based modelling of osmotic energy generation using pressure retarded osmosis (PRO). *Desalination*, 389:98–107, 2016
5. X. Zhang, Y. Wang, M. Gugala, and J.-D. Müller. Geometric continuity constraints for adjacent nurbs patches in shape optimisation. *ECCOMAS-2016*, 2016
6. W. He, Y. Wang, V. Elyasigomari, and M. H. Shaheed. Evaluation of the detrimental effects in osmotic power assisted reverse osmosis (RO) desalination. *Renewable Energy*, 93:608–619, 2016
7. Y. Geng, G. Qin, Y. Wang, and W. He. The research of space-time coupled spectral element method for acoustic wave equationthe research of space-time coupled spectral element method for acoustic wave equations. *Chinese Journal of Acoustics*, 35(01):31–49, 2016
8. S. Akbarzadeh, Y. Wang, and J.-D. Müller. Fixed point discrete adjoint of SIMPLE-like solvers. In *22nd AIAA Computational Fluid Dynamics Conference*, page 2750, 2015
9. Y. Wang, S. Akbarzadeh, and J.-D. Müller. Stabilisation of discrete adjoint solvers for incompressible flow. In *22nd AIAA Computational Fluid Dynamics Conference*, page 2749, 2015
10. W. He, Y. Wang, and M. H. Shaheed. Maximum power point tracking (MPPT) of a scale-up pressure retarded osmosis (PRO) osmotic power plant. *Applied Energy*, 158:584–596, 2015
11. W. He, Y. Wang, and M. H. Shaheed. Stand-alone seawater RO (reverse osmosis) desalination powered by PV (photovoltaic) and PRO (pressure retarded osmosis). *Energy*, 86:423–435, 2015

## 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 Graduates (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* Scholarship (1st Class, Top 15%)

## Teaching and supervising experiences

- 2012 - 2015 Teaching and demonstrating in undergraduate courses:
  - Heat transfer and Fluid Mechanics: teaching assistant
  - Mechanics of Fluids: experiment demonstration and report marking
  - Computer Aided Engineering in Fluids and Solids: OpenFOAM tutorial
- 2009 - 2012 Instructor of Class 2009 in Department of Fluid Machinery