Curriculum Vitae, Songrui LI

Contact Information

58 Luopu Rd
Jiading District
Shanghai, China 20180

Tel: +86 13313699961
E-mail: sl3119@ic.ac.uk
WWW: https://lsongrui.me/

Research Interests

My interests include leveraging machine learning algorithms for modeling dynamical systems, such as data-driven surrogate models and physics-informed neural networks. Additionally, I have a keen interest in GPU-based high-performance computing.

Vocational Experience

SAIC Volkswagen Automotive Co., Ltd., China

Data Science Engineer (Rotational Position), Data&Connectivity Group **6/2023 - Present**

- Conducted the data-driven automotive predictive maintenance development with aftersale, quality assurance, and related R&D departments

CFD Research Engineer, Pre-R&D Group **5/2021 - Present**

- Led the optimization of DualSPHysics, an open-source SPH solver written by C++ and CUDA, in charge of integrating surface tension and one-way coupling algorithms in collaboration with Pro. Zhe JI, Northwestern Polytechnical University
- Developed machine-learning-based software to predict aeroacoustic noise caused by vehicle gaps, in charge of neural network training, and GUI development.
- Developed data-processing software for analyzing automotive soiling test results using image segmentation techniques, in charge of neural network training, and GUI development
- Conducted calibrations of optimized solvers and meshing tools for OpenFOAM
- Trained 3 first-year developers in C++, GPU computing and CFD algorithms

Education Background

M.Sc., Advanced Computational Methods for Aeronautics, Flow Management and Fluid-Structure Interaction

Department of Aeronautics, Imperial College London, UK **9/2019 - 11/2020**

- Grade: 74.3/100
- Thesis: Bifurcation and Oscillation Effects of Gyrotactic Swimming Microorganism Suspension
- Key modules: CFD, HPC, Flow Control, Hydrodynamic Stability, and Separated Flows, etc.

B.Eng., Flight Vehicle Propulsion Engineering

School of Aeronautics, Polytechnic University of Madrid, Spain **01/2019-07/2019**

- Exchange student for the graduation project, Mark: 9.0/9.9
- Thesis: Flow Field Analysis Based on RANS Solver and BiGlobal Stability Theory

Faculty of Mechanical Engineering, University of Southern Denmark **08/2018**

- Exchange student for international summer school, 7-point Mark: 7

School of Power and Energy, Northwestern Polytechnical University, China **09/2015-01/2019**

- Grade: 86.5/100, 11 out of 269
- Key modules: Fluid Mechanics, Heat Transfer, Mechanical theory, Turbo-machinery, etc.

Pre-university Qualification: Total Score of NCEE (GaoKao): 619/750 (First Tier Line, 483)

Academic Experience

Bifurcation and Oscillation Effects of Gyrotactic Swimming Microorganism Suspension in Vertical Pipe (Individual)

Imperial College London MS.c Individual Project **05/2020-10/2020**

Director: Dr. Yongyun Hwang, Dr. Lloyd Fung

- Developed a semi-implicit finite volume solver on MATLAB for microorganism suspensions
- Validated the bifurcation diagrams of central cell concentration with fixed flow rate
- Discovered new bifurcations and instabilities under fixed and oscillating pressure gradients
- Interpreted the pulsatile flow by deriving a linearized transfer function

Flow Field Analysis Based on RANS Solver and BiGlobal Stability Theory (Individual)

Undergraduate Graduation Project & Erasmus+ Scholarship Programme **02/2019-06/2019**

Directors: Professor Eusebio Valero Sanchez & Associate Professor Yaguo Lyu

- Performed Strouhal number validation and stability analysis of vortex shedding from a cylinder
- Discovered the dominant eigenmode of the NACA0012 airfoil under critical angle of attack
- Conducted biGlobal stability analysis, POD and DMD for round/straight trailing edged injectors under subsonic and transonic flows

Optimisation of a Wind Turbine Airfoil Prototype (Participant)

International Summer school: Experimental Fluid Mechanics Group Project **8/2018**

Faculty of Mechanical Engineering, University of Southern Denmark

- Introduced effective vortex generators to a wind turbine airfoil
- Carried out related wind tunnel and water channel PIV tests
- Visited the *LM Wind Power* Test and Validation Centre

Design Research on a Bionic Anti-drag Propeller (Project manager)

China college students "Internet+" Innovation Competition **04/2017-04/2018**

Ministry of Education, China

Director: Professor Yangang Wang

- Proposed and designed a novel UAV propeller with a serrated leading edge
- Led the group through 3D modeling, CFD simulations, and data analysis

Starting Test of a Pulse Jet Engine (Participant)

Scientific Research Practice Program **07/2017-08/2017**

Director: Professor Hong Yan

- Set up the experiment platform
- Measured the thrust and pressure pulse frequency of a valveless pulse engine

Books

2016全国象棋个人赛精彩对局解析 **6/2018**

(Reviews of the best games of the 2016 National Xiangqi Individual Competition)

陈启明, 周军, **李嵩瑞(Songrui LI)**

ISBN-13: 9787559106551, ISBN-10: 7559106552

2016全国象棋杯赛精彩对局解析 **4/2018**

(Reviews of the best games of the 2016 National Xiangqi Cup Competition)

陈启明, 刘锦祺, **李嵩瑞(Songrui LI)**

ISBN-13: 9787559106568, ISBN-10: 7559106560

Honors and Awards

Excellence prize in SVW Digital R&D Talent Training Project Intermediate Level, Tsinghua University Suzhou Automotive Research Institute, SAIC-VW Automotive Co., Ltd., 12/2021, 2 in total

Erasmus+ International Credit Mobility Scholarship(KA107) with travel aid, NO.2017-1-ES01-KA107-036986, European Union, 12/2019-6/2019, 641 students & staffs in China

Exemption of the tuition fee, accommodation support by University of Southern Denmark and travel aid by Northwestern Polytechnical University, 8/2018, 12 in total

NPU Distinguished Student Scholarship of Academic Year 2016-2017, School of Power and Energy, Northwestern Polytechnical University, 12/2017, 5 out of 266

NPU Distinguished Student Scholarship of Academic Year 2015-2016, Northwestern Polytechnical University, 12/2016, 5 out of 263

Third-level WU Yajun Special Scholarship, Northwestern Polytechnical University, 12/2016, 10 out of 6390

Third-level Prize in the Seventeenth College Students Mathematical Contest in Modeling, Northwestern Polytechnical University, 06/2016, 30 out of 100

Computer Skills

Computer Languages: C++, CUDA, Python, MATLAB, FORTRAN, HTML&CSS, TypeScript

Open-source Software&APIs: OpenFOAM, DualSPHysic, PyTorch, TensorFlow, Vue, Node.js

Commercial Software: ANSA, CATIA, STAR-CCM+