Yichen Liu

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EDUCATION

Master in Automotive Aerodynamics **Changchun, China**
College of Automotive Engineering, Jilin University Sep. 2018 – Jun.2021
State Key Laboratory of Automotive Simulation and Control
Dissertation title: "Research on Aerodynamic Characteristics of Rotating Isolated Wheel based on Parametric Modeling"
Cumulative GPA: 3.44/4.0 (85.93/100); *Ranking*: 8/35.

Bachelor in Industrial Design **Xi'an, China**
School of Mechanical Engineering, Xi'an Jiaotong University Sep. 2014 – Jun.2018
Dissertation title: "Design of Low-aerodynamic-drag Semi-truck based on JIEFANG JH6 and the Boxfish"
Cumulative GPA: 3.54/4.3 (86.14/100); *Ranking*: 1/18.

RESEARCH INTERESTS

- Automotive aerodynamics
- Reduced Order Model（POD & DMD）based flow field analysis
- Machine learning-based optimization & Active flow control
- CFD commercial/open-source software redevelopment

RESEARCH EXPERIENCE

Master degree' s **Sep. 2018 – Jun. 2021**

Interdisciplinary application of aerodynamics-automated workflow

- Consolidated the aerodynamics-automated workflow into self-developed interactive software and applied them to industrial fields.
- Developed an Automated Modeling Platform for Simplified Wheel (AMPSW) based on Rhinoceros 6/Beta ANSA/STAR-CCM+.

Evaluating the time-averaged/transient flow field and aerodynamic forces on the isolated rotating tire

- Applied the Detached Eddy Simulation and Slide Mesh methods to simulate the transient flow field around the rotating isolated wheel.
- Made a POD-ROM based transient flow field analysis.
- Compared the aerodynamic effects of different spokes based on AMPSW.

Establishment of a new adaptive optimization method on vehicle aerodynamics based on machine learning

- Applied the Particle Swarm Optimization (PSO) methods into the self-adjusting process of the hyper-parameters of the Least Square SVR (LSSVR) and obtained the PSO-LSSVR model.
- Modified the iteration of a previous adaptive optimization method based on obtained PSO-LSSVR approximation model.
- Implemented the PSO-LSSVR adaptive optimization method to the rapid optimization of boat-tail of GTS model.

Bachelor degree' s **Nov.2017 – Jun.2018**

Application of a bionic-aerodynamic design in the body of semi-truck

- Designed a truck body with extremely low aerodynamic drag (i.e., about 40% of the aerodynamic drag of traditional ones).
- Analyzed drag reduction mechanism by using CFD.
- Validated the simulation by using the wind tunnel test.

PUBLICATIONS

- X. J. Hu, **Y. C. Liu**, et al. 'Optimization of low aerodynamic drag boat-tail of GTS model based on adaptive approximation model,' Journal of South China University of Technology (Natural Science Edition) 49, 2021: 38-46. (in Chinese, **EI**)

  Be responsible for methodology, simulation, data analysis, writing, and revision.
- Y. H. Zhang, X. J. Hu, Z. Hui, **Y. C. Liu** et al. 'Parameter interval optimization of the DBD plasma actuator based on orthogonal experiment and RBF neural network approximation model,' Physics of Plasmas 28, 2021:023504. (**SCI**)

  Be responsible for methodology and discussion of optimization and revision.
- Y. H. Zhang, X. J. Hu, W. Lan, **Y. C. Liu** et al. 'Application of omega vortex identification method in cavity buffeting noise,' Journal of Hydrodynamics 33, 2021: 259-270. (**SCI**)

  Be responsible for image processing.
- Y. H. Zhang, X. J. Hu, **Y. C. Liu**, et al. 'Experimental research on the breakdown characteristics of SDBD-PA based on regression model,' Journal of Mechanical Engineering, 2021. (Accepted, in Chinese, **EI**)

  Be responsible for discussion of regression model application.
- X. J. Hu, Z. Q. Zhang, J. C. Li, **Y. C. Liu**, et al. 'Structure optimization of the vacuum nozzle based on interval multi-objective optimization algorithm,' Journal of Jilin University (Engineering and Technology Edition) 50, 2020: 1991-1997. (in Chinese, **EI**)

  Be responsible for discussion of optimization.

PATENTS & SOFTWARE

- G. L. Hu, L. Sun, D. Pang, **Y. C. Liu**, et al. *Multi-layer machine for coin sorting and packaging* (Chinese Invention, CN106530477B)
- **Y. C. Liu**, X. J. Hu, et al. *A kind of electric moving system for the lead screw balance stand of automobile wind tunnel* (Chinese Utility Model, CN209198044U)
- **Y. C. Liu**, X. J. Hu, et al. *A kind of flexible vehicle platform for wind tunnel test with active rotating wheels* (Chinese Utility Model, CN211147983U)
- **Y. C. Liu**. *4WS system based on double-stacking steering wheel* (Chinese Utility Model, CN203228844U)
- X. J. Hu, **Y. C. Liu**, et al. *ABAQUS Subroutine generator for simulation of temperature rise in brake disc v1.0* (Chinese Software Copyright, 2019SR1373748)
- X. J. Hu, **Y. C. Liu**, et al. Automated modeling software for wheel with fan-style spoke v1.0 (Chinese Software Copyright, 2019SR1373741)
- X. J. Hu, **Y. C. Liu**, et al. Calculation software for CFD boundary layer v1.0 (Chinese Software Copyright, 2019SR1415211)

PROFESSIONAL SERVICE

Product Planning Engineer **Aug. 2021 – Present**
Department of Product Planning, CHANGAN AUTO, China

Intern Automotive Body Engineer **Jul. 2017 – Aug. 2017**
Department of Advanced Engineering, SAIC MOTOR, China

Summer Student **Aug. 2016**
Graduate School of Engineering, Chiba University, Japan

TECHNICAL SKILLS

Computer Skills

- Computer-aided design/engineering: such as CATIA, OpenFOAM, STAR-CCM+, and ANSYS Fluent.
- Programming languages and mathematical packages: Python, MATLAB, Taichi, PyTorch.
- Knowledge of Object-Oriented Programming.
- Knowledge of FDM 3D printing.
  Designed a 1:16 wind tunnel model for Low-aerodynamic-drag Semi-Truck based on JIEFANG JH6.

Experimental Skills

- Proficient in wind tunnel tests.
  Capable of measuring forces based on high-resolution balance, pressure based on pressure scanner, and fluid flow based on PIV.

Languages

- English (IELTS 6.0; CEFR-B2)
- Japanese (J.TEST E-class; CEFR-A2)
- Chinese (Native; CEFR-C2)

Others

- Knowledge of vehicle, especially in industrial needs and application.

FELLOWSHIPS & AWARDS

- Second-class Outstanding Postgraduate Scholarship of Jilin University, China — Dec. 2020
- Second prize at the province level, the 12th Certificate Authority Cup Mathematical Contest in Modeling, China — May. 2019
- Outstanding Graduate Award of Xi'an Jiaotong University, China — Jun. 2018
- Taiwan HIWIN Scholarship — Dec. 2017
- First prize at the national level, the 7th National Undergraduate Mechanical Innovative Design Competition, China — Jul. 2016
- Third prize at the national level, the 28th China Adolescents Science & Technology Innovation Contest — Aug. 2013