

QIAOMAI LIU

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SUMMARY

I am a Master's student (2021-2024) at the School of Chemical Engineering and Technology, Xi'an Jiaotong University, co-advised by Prof. Simin Wang and Prof. Juan Xiao. My research work focuses on the experimental and numerical investigation on gas combustion of hydrogen blended fuel to mitigate global warming toward carbon neutrality by 2050

EDUCATION

Xi'an Jiaotong University

M.S. in Power Engineering and Engineering Thermophysics

Xi'an, Shaanxi

Sep. 2021 – Current

- GPA: **3.47/4.00** [[87.20/100](#)], Class Rank: 7/21
- Relevant Coursework: Numerical Heat Transfer & Advanced Engineering Thermodynamics

Xinjiang University

B.S. in Process Equipment and Control Engineering

Urumqi, Xinjiang

Sep. 2017 – Jun. 2021

- GPA: **3.59/5.00** [[87.29/100](#)], Class Rank: 4/72
- Relevant Coursework: Process Fluid Machinery & Process Equipment Design

PUBLICATIONS

In publication (+: Co-first Author, *: Corresponding Author)

1. **Liu, Q.**, He, S., Xiao, J.* , & Wang, S.* (under review). Effects of Central Split Bluff Body on Combustion Characteristics and NOx Emission with Non-premixed H₂/Air Flames, *Combustion Science and Technology*, 2023.
2. **Liu, Q.**, He, S., Xiao, J.* , & Wang, S.* (under review). Numerical Investigation on the Morphology and Pollutant Emissions of Bluff Body Hydrogen-blended Methane/Air Diffusion Flames, *Chinese Journal of Chemical Engineering*, 2023 (EI, in Chinese).
3. **Liu, Q.**, He, S., Xiao, J.* , & Wang, S.* (working paper). Investigation on the Effects of Hydrogen Addition on Non-premixed Methane/Air Combustion and Emission Characteristics, 2023.
4. He, S., **Liu, Q.**, Wang, S.* , & Xiao, J.* (under review). Two-phase Flow Simulation and Surrogate-Assisted Optimization of Gas Film Drag Reduction in High-concentration Coal-water Slurry Pipelines, *Chinese Journal of Chemical Engineering*, 2023 (EI, in Chinese).
5. Song, C., **Liu, Q.**, Dong, J, Wang, J.* , & Wang, S.* (working paper). Experimental Investigation of Particle Dispersion Characteristics in a Fluidized Bed with the Binary Mixture Using the Optical Fiber Probe Method, 2023.
6. Wang, J.+ , **Liu, Q.**+ , & Wang, S.* (working paper). Process Characteristics and Energy Efficiency in the Submerged Combustion Treatment of High-salt and High-COD Wastewater, 2023.

Published

7. Duan, X.+ , Zhou, A.+ , **Liu, Q.**, Xiao, J., & Wen, J.* (accepted). Numerical Simulation and Structural Optimization of Electrolyzer Based on the Coupled Model of Electrochemical and Multiphase Flow. *International Journal of Hydrogen Energy*, 2023.
8. Wang, J.+ , Song, C.+ , **Liu, Q.**, & Wang, S.* . Pilot-scale Investigation on a Spraying Pretreatment Process Integrated with an Axial Flow Cyclone to Separate Fine Particles with Low Energy Consumption, *Industrial & Engineering Chemistry Research*, 2023, 62(39), 16125-16138. <https://doi.org/10.1021/acs.iecr.3c02146>.

Patents

9. Xiao, J., **Liu, Q.**, & Wang, S. (submitted). A Flow Rate Adaptive Combustion Device, Chinese Patent, 2023.
10. Xiao, J., **Liu, Q.**, & Wang, S. (submitted). A Methane-hydrogen Mixing Flow Rate Adaptive Combustion Testing System and Testing Method, Chinese Patent, 2023.
11. Xiao, J., **Liu, Q.**, & Wang, S. (submitted). A High-efficiency and Stable Combustion Testing System and Process for Natural Gas with Hydrogen Addition, Chinese Patent, 2023.

Conference Presentations (underline: presenter)

12. **Liu, Q.**, Xu, S., & Wang, S.* Study on Flame Characteristics and Pollutant Distribution of Methane-Hydrogen Combustion. Chemical Engineering Machinery Conference, Xi'an, China, 24-26 March, 2023. [[abstract](#)] [[presentation](#)] (in press).
13. **Liu, Q.**, Song, C., Wang, S.* , & Wen, J. Numerical Simulation of Operation and Structural Parameter Optimization for Industrial Riser Reactors. The 11th National Conference of Fluidization and Particle Technology, Hangzhou, China, 17-19 October, 2021 [[abstract](#)] [[poster](#)].

GRANTS

Delineated the proposal artworks for the National Natural Science Foundation of China (No. 22308273) [[artwork](#)] 2023

AWARDS & HONORS

Excellent Young Scholar Paper Presentation Award, Chemical Engineering Machinery Conference 2023
Course Scholarship for Graduate Student, Xi'an Jiaotong University 2022
Scholarship for Graduate Students Recommended for Admission, Xi'an Jiaotong University 2021
Direct Admission to Graduate School with Entrance Examination Waived, Minister of Education of China 2020
Scholarship for Motivation, Xinjiang Uygur Autonomous Region People's Government 2018 – 2020
Advanced Individual Award in the Practice of Educating People Thematic Activity, Xinjiang University 2018

PROFESSIONAL EXPERIENCES

Hydrogen Blended NG Combustion Experiment | *CFD, Python & Experimental devices* Sep. 2022 – Current

- Designed the non-premixed hydrogen blended Natural Gas (NG) combustion system scheme on a laboratory scale; set up and improved experimental platform
- Projected the integration of two novel flame holders (bluff body & swirler) to achieve a highly efficient, safe hydrogen-blended combustion tested with reduced pollutant emissions
- Conducted a numerical investigation on the combustion behavior of hydrogen-blended NG using the EDC model coupled with GRI-Mech 3.0; implemented the physical experiment of the temperature measurement, flame observation, and exhaust gas analysis with Testo 350
- Delineated the poster of “Numerical Simulation and Experimental Research on Combustion” [[poster](#)]

Submerged Combustion Experiment | *Inventor, SketchUp & Experimental devices* Aug. 2022 – Jun. 2023

- Drafted the experimental scheme of submerged combustion experiment system by designing the test platform and operation conditions with the full-scale 3D model for visualization and further practical manufacturing
- Improved the submerged combustion system based on the implementation of successive combustion operations and data collection, achieving safety and sustainability
- Identified the experimental temperature measurement problem of multiple thermocouples, influenced by both high-temperature gradients and a harsh two-phase evaporation process under extreme testing conditions

The Cold Dual-Dispersed Fluidization Experiment | *Solidworks & Experimental devices* Aug. 2021 – Jun. 2022

- Prepared the experimental raw materials of Geldart A and B particles; measured the particles' composition and size with the X-ray Diffraction (XRD) and the laser particle size analyzer
- Completed the experimental observation, monitoring, and analytical measurement process of bed pressure drop, particle swelling height, in-bed particle agglomeration concentration (based on the fiber optic probe method of PC6M), and transition of flow regimes under specified operating condition
- Solved the obstacle-influenced data measuring process and experimental operation procedure by making the proper geometrical adjustments and physical improvements to the fluidized bed observation window

The Pipe Stress and Vibration Analysis Simulation | *Bentley PULS, CAESAR II* Dec. 2021 – Feb. 2022

- Scrutinized acoustic analysis of pressure pulsation patterns, established the machine's excitation frequency with the peak pressure pulsation locations and magnitudes identified; evaluated the pipeline design's adequacy
- Performed static and dynamic analyses on the problematic pipeline segment (per ASME B31.3 and B31.1) through natural frequency and modal analyses of the pipeline; pinpointed the maximum stress overshoot locations
- Proposed strategically adding corresponding supports to avert resonance occurrences, considering the relative values of the machine excitation frequency and pipeline natural frequency

Gas-particulate Two-Phase Flow Simulation | *CFD, Solidworks, Origin* Aug. 2021 – Jan. 2022

- Executed physical modeling and numerical model validation of CFD parameters with a 3D two-phase non-reactive flow model for industrial-scale FCC riser reactor and the atomizing nozzles; drafted and compiled officially the computational reports and analysis of documentation

REFERENCES

Dr. Yunsong Yu Email: cloud.pine02@mail.xjtu.edu.cn
Vice Dean, Professor of Chemical Engineering and Technology School of Xi'an Jiaotong University

Dr. Simin Wang Email: smwang@mail.xjtu.edu.cn
Professor of Chemical Engineering and Technology School of Xi'an Jiaotong University

Dr. Juan Xiao Email: juanxiao@xjtu.edu.cn
Assistant Professor of Chemical Engineering and Technology School of Xi'an Jiaotong University

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