Xinhui CHEN

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EDUCATION

South China University of Technology "Project 985" Guangzhou, CN
M.Eng. of Resources and Environmental Engineering (Safety Engineering) *Sep. 2022 – Present*

- **Average Score**: 86.89/100
- **Core Courses**: *Case Studies on Production Accidents (91), Applied Statistics Theory and Method (93), Safety Production Technology (90), Fire Science (85)*

Northeastern University "Project 985" Shenyang, CN
B.Eng. of Safety Engineering *Sep. 2018 – Jun. 2022*

- **Average Score**: 87.96/100 **Ranking**: 7/56 (Top 12.5%)
- **Core Courses**: *Course design (Fire and Explosion Prevention) (95), Heat Transfer (95), Fundamentals in Numerical Modelling of Complex Industrial Multiphase Flows (98), C Programming Language (90)*

RESEARCH INTERESTS

- Computational Fluid Dynamics (CFD)
- Artificial Intelligence (AI), Machine Learning
- Safety Science and Engineering
- Simulation, Modelling and Numerical Methods

PUBLICATIONS

[1] Liu, Z. (Advisor), **Chen, X.***, Tian, F.*, Zhu, W., Hu, Z., Su, W., & Wang, Z. (2023). Dynamic effects of rough elements in fractures on coal permeability during different stages of methane extraction. *Gas Science and Engineering*, 119, 205118. DOI: 10.1016/j.jgsce.2023.205118. **(SCI, JCR Q1, IF=5)**

[2] **Chen, X.***, Tang, Z., & Mo, Y. (2023). Design, Processing and Performance Testing of Extra-Large-Flow Centrifugal Model Pumps. *Journal of Physics: Conference Series*, 2610(1), 012022. DOI: 10.1088/1742-6596/2610/1/012022.

[3] **Chen, X.**, Huang, S., Guan, T., Fu, H., & Pan, Z. (Accepted). Prediction model of liquid holdup of multiphase pipelines based on PSO-BP algorithm. *Chemical Engineering (China)*.

[4] Yang, G., **Chen, X.***, Hu, Y., Huang, S., & Xu, H. (Accepted). Analysis of vibration characteristics of cryogenic insulated cylinders based on ANSYS. *Journal of Physics: Conference Series*.

[5] Xie, H., Ou, C., **Chen, X.**, & Yang, G. (2023). Numerical analysis of the temperature rise at fast filling of hydrogen storage cylinder based on fluid-thermal-solid coupling. *Journal of Physics: Conference Series*, 2610(1), 012025. DOI: 10.1088/1742-6596/2610/1/012025.

MANUSCRIPTS

[1] **Chen, X.**, Huang, S.*, Guan, T., Fu, H., & Pan, Z. (In Preparation). An interpretable predictive model for liquid holdup of hilly-terrain oil-gas pipelines based on machine learning and Shapley additive explanations.

PATENT

[1] Huang, S., **Chen, X.**, Guan, T., & Fu, H. (2024). Prediction method for liquid holdup of hilly-terrain oil-gas pipelines based on SSA-BP neural network. (Chinese Patent No. 202410626009.7)

RESEARCH PROJECTS

AI-based predictive model for liquid holdup in hilly-terrain multiphase flow pipelines
Principal Investigator **|** *Advisor: Prof. Si Huang* *Jun. 2023 – Present*

- Constructed 8,000 sets of hilly-terrain oil-gas pipelines considering angles and elevations
- Simulated the oil-gas flow under 81 working conditions using the multiphase flow simulation software OLGA
- Developed an AI-based prediction model, leveraging a dataset comprising 648,000 simulation results

- Established an interpretable model incorporating SHapley Additive exPlanations to unravel the global contributions and interactions of factors in the AI black box

Influence of fracture morphology on gas migration patterns in coal

Principal Investigator **|** *Advisor: Prof. Zhengdong Liu* *Mar. 2021 – Sep. 2023*

- Derived a new numerical model of rough-walled fractures that innovatively simplifies the fracture surface
- Proposed a concept of effective fracture aperture that varies nonlinearly with the CH_4 extraction process
- Constructed a CFD model of methane extraction using COMSOL Multiphysics, in which the governing equations for gas diffusion and seepage influenced by the new numerical model were imported
- Analyzed the dynamic effect of roughness, stagger degree and shape of rough elements on CH_4 migration

Simulation and testing of vibration characteristics of cryogenic insulated cylinders

Principal Investigator **|** *Advisor: Prof. Si Huang* *May 2024 – Present*

- Formulated a modal analysis model for the cryogenic insulated cylinder utilizing ANSYS
- Delved into the natural frequency trends of the cylinder across varying filling percentages

Fluid-thermal-solid coupling of carbon fiber full-wrapped hydrogen cylinders during fast inflating

Co-investigator **|** *Advisor: Prof. Si Huang* *Jan. 2023 – Jun. 2023*

- Established a fluid-thermal-solid coupled CFD model for fast inflating of carbon fiber full-wrapped hydrogen cylinders based on ANSYS
- Verified that the maximum stress point on the cylinder corresponds precisely to the vulnerability pinpointed by acoustic emission signal mapping

Hydraulic model design and test of large capacity vertical centrifugal pump

Co-investigator **|** *Advisor: Prof. Si Huang* *Sep. 2022 – Jan. 2023*

- Designed a model pump based on a prototype pump according to similarity principles
- Constructed physical models of centrifugal pumps utilizing CFTurbo
- Established the CFD model of centrifugal pumps using CFX

HONORS & AWARDS

South China University of Technology Graduate Scholarship (two times, HKD$19,700) *Sep. 2022 – Jun. 2024*
Merit Undergraduate Thesis, Northeastern University (Top 2%) *Jun. 2022*
Likang Group Safety Engineering Scholarship (HKD$3,600) *Oct. 2021*
The National Undergraduate Mathematics Competitions, Third prize of national *Dec. 2020*
The National Undergraduate Mathematics Competitions, Second prize of provincial *Dec. 2020*
Northeastern University Merit Student Scholarship, Third prize (four times) *Sep. 2018 – Jun. 2022*

ACADEMIC CONFERENCES

The 4th International Conference on Fluid and Chemical Engineering, Wuhan, China *July 26 – 27 2024*
The 3th International Conference on Fluid and Chemical Engineering, Wuhan, China *July 21 – 22 2023*

SKILLS

Technology: ANSYS, COMSOL Multiphysics, OLGA, MATLAB, SpaceClaim

Language: Mandarin (Native), English (CET-6: 518; IELTS: In preparation), Cantonese (Basic)