Yanbing Dai

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Research Interests

Energy systems optimization; Waste heat recovery; Energetic, exergetic, economic, and environmental analysis of energy systems; Process integration for enhanced efficiency and sustainability.

Education

Xi'an Jiaotong University (XJTU, Top 10 in China) **Xi'an, China**

M.S. in Energy and Power Engineering (GPA: 91.92/100, Rank: 2/34) Sep 2022 - Jun 2025

B.E. in Energy and Power Engineering (GPA: 85.39/100) Sep 2017 - Jun 2021

Warsaw University of Technology (Top 3 in Poland) **Warsaw, Poland**

Summer School on Power Engineering - Energy Sources, Conversion and Storage (obtained 5 ECTS credits) Aug 1, 2019 - Aug 14, 2019

Publications

Journal Articles

1. X. Han, **Y. Dai**, X. Guo, K. Braimakis, S. Karellas, J. Yan. A novel dual-stage intercooled and recuperative gas turbine system integrated with transcritical organic Rankine cycle: System modeling, energy and exergy analyses. *Energy*, 2024, 305: 132252. [X. Han is the advisor, and Y. Dai completed the majority of the research work as the second author]

2. M. Su, X. Han, **Y. Dai**, J. Wang, J. Liu, J. Yan. Investigation on recirculated regenerative solid desiccant-assisted dehumidification system: Impact of system configurations and desiccant materials. *Energy*, 2024, 286: 129629.

3. X. Han, T. Yuan, D. Zhang, **Y. Dai**, J. Wang, J. Liu, J. Yan. Waste heat utilization from boiler exhaust gases for zero liquid discharge of desulphurization wastewater in coal-fired power plants: Thermodynamic and economic analysis. *Journal of Cleaner Production*, 2021, 308: 127328.

4. H. Wang, Y. Qian, **Y. Dai**, X. Han, W. Chen, J. Yan. Comparative thermodynamic analysis and optimization design of open Brayton cycle configurations. *Journal of Engineering Thermophysics*, 2024, 45(7): 1890-1896. [In Chinese]

Conference Papers

1. **Y. Dai**, X. Han, X. Guo, J. Yan. Part-load performance analysis of an intercooled and recuperative gas turbine system integrated with transcritical organic Rankine cycle. *16th International Conference on Applied Energy*, Niigata, Japan, Sep 1-5, 2024. [Oral Presentation]

2. **Y. Dai**, X. Han, X. Guo, K. Braimakis, S. Karellas, J. Yan. Thermodynamic analysis of a novel dual-stage intercooled and recuperative gas turbine-transcritical organic Rankine cycle power generation system. *3rd International Conference for Global Chinese Academia on Energy and Built Environment*, Shanghai, China, Jul 29-31, 2023. [Poster Presentation]

3. **Y. Dai**, X. Han, Y. Zhang, Y. Yang, W. Chen, J. Yan. Multi-objective optimization and off-design performance analysis of air Brayton cycle configurations. *The Engineering Thermodynamics and Energy Utilization Branch of the Engineering Thermophysics Society*, Xiamen, China, Dec 13-16, 2024. [In Chinese. Accepted]

4. X. Han, **Y. Dai**, T. Yuan, D. Zhang, J. Liu, J. Yan. Thermodynamic and techno-economic analysis of solar-steam hybrid driven flue gas desulfurization wastewater zero liquid discharge system. *12th International Conference on Applied Energy*, Bangkok, Thailand, Dec 1-10, 2020. [Oral Presentation. X. Han is the advisor, and Y. Dai completed the majority of the research work as the second author]

5. Y. Li, **Y. Dai**, X. Han, X. Guo, S. Karellas, J. Yan. Process modeling and economic viability analysis of a power-to-H_2-to-power system: Case study in China. *ECOS 2024 - Proceedings of the 37th International Conference on Efficiency, Cost, Optimization, Simulation and Environmental Impact of Energy Systems*, Rhodes, Greece, Jun 30-Jul 5, 2024. [Oral Presentation]

6. M. Su, X. Han, **Y. Dai**, J. Wang, J. Liu, J. Yan. Investigation on recirculated regenerative solid desiccant-assisted dehumidification system: Impact of system configurations and desiccant materials. *3rd International Conference for Global Chinese Academia on Energy and Built Environment*, Shanghai, China, Jul 29-31, 2023. [Oral Presentation]

7. H. Wang, Y. Qian, **Y. Dai**, X. Han, W. Chen, J. Yan. Comparative thermodynamic analysis and optimization design of open Brayton cycle configurations. *The Engineering Thermodynamics and Energy Utilization Branch of the Engineering Thermophysics Society*, Luoyang, China, Nov 10-13, 2023. [In Chinese. Outstanding Paper Award. Oral Presentation]

Patents

1. X. Han, **Y. Dai**, Y. Zhang, Y. Zhou, W. Chen, J. Wang, J. Liu, J. Yan. A closed air Brayton cycle power generation system coupled with seawater desalination. *Intellectual Property Publishing House Co., Ltd*, China Patent CN202410589966.7, 2024 Aug 23. [In Chinese. Publication. X. Han is the advisor, and Y. Dai completed the majority of the research work as the second author]

2. X. Han, H. Wang, Y. Qian, W. Chen, X. Tang, **Y. Dai**, J. Liu, J. Yan. A multi-objective optimization and configuration screening method for closed air Brayton cycle. *Intellectual Property Publishing House Co., Ltd*, China Patent ZL202310880459.4, 2024 Mar 6. [In Chinese]

Software Copyright

1. X. Han, H. Wang, **Y. Dai**, Y. Qian, W. Chen, J. Yan. Closed air Brayton cycle configuration optimization software considering diversified application scenarios. *China Copyright Protection Center*, 2024SR0071522, 2024 Jan 10. [In Chinese]

Research Experience

Design and Performance Analysis of Gas Turbine-Organic Rankine Cycle Combined Cycles

Advisor: **Assoc. Prof. Xiaoqu Han** Sep 2022 - Present

- Proposed a combined cycle integrating an intercooled and recuperative gas turbine with a transcritical organic Rankine cycle, achieving enhanced waste heat recovery and improving system efficiency from 43.88% to 62.48%.
- Developed an energy and exergy analysis model using THERMOFLEX software, including part-load operation analysis models.
- Designed the system and analyzed its performance under design and part-load conditions.

Configuration and Cold-End Optimization of High-Efficiency Air Brayton Cycles

Advisor: **Assoc. Prof. Xiaoqu Han** Sep 2022 - Present

- Utilized EBSILON and MATLAB to conduct thermodynamic design for various open and closed air Brayton cycle configurations using a "system-component" integrated design approach.

- Performed single- and multi-objective optimizations based on power generation efficiency and power density using a genetic algorithm for both open and closed cycle configurations.
- Analyzed the performance of different configurations under varying loads and ambient temperatures in fixed and mobile power generation scenarios.
- Investigated the impact of cold-end design on the performance of closed air Brayton cycles.

High-Efficiency, Low-Cost Treatment and Recovery Technology for Wastewater in Coal-Fired Power Plants

Advisor: **Assoc. Prof. Xiaoqu Han** Sep 2019 - Jun 2022

- Proposed an improved flue gas-driven forced-circulation multi-effect distillation and crystallization system to achieve simultaneous wastewater mitigation, water recovery, and energy savings.
- Developed a thermodynamic and techno-economic analysis model in FORTRAN, validated with literature data and real power plant measurements.
- Integrated solar collectors to achieve zero liquid discharge (ZLD) of flue gas desulfurization wastewater, reducing the levelized cost of wastewater treatment (LCOW) by 8%.

Leadership

Xi'an Jiaotong University **Xi'an, Shaanxi**

Class President Sep 2022 - Present

- Organized and led class meetings, ensuring smooth communication between students and faculty.
- Coordinated class activities and events, managing a team of 34 students.
- Facilitated conflict resolution within the class, promoting a harmonious learning environment.

Class Representative in Charge of Studies Sep 2018 - Jun 2021

- Collected and distributed assignments for 27 students, ensuring timely submission and feedback.
- Planned and organized collaborative learning activities to enhance peer-to-peer support.
- Handled communication between students and teachers regarding academic concerns.

Honors and Awards

Top-Tier Graduate Academic Scholarship, Xi'an Jiaotong University	2023, 2024
Power Plant Alumni Scholarship, School of Energy and Power Engineering	2024
Excellent Postgraduate, Xi'an Jiaotong University	2024
Excellent Postgraduate Cadre, Xi'an Jiaotong University	2023
Third-Class Scholarship, Xi'an Jiaotong University	2018

Service

Reviewer of ***Journal of Cleaner Production*** and ***Energy*** 2024

- Completed 6 peer reviews

Skills

System Design	THERMOFLEX, EBSILON, HTRI
Programming	MATLAB, FORTRAN, LaTeX
Languages	Mandarin (Native), English (Fluent, TOEFL: 95)