Tian Zhao

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Education

Sept. 2013 - Jul. 2019	Ph.D. **Power Engineering and Engineering Thermophysics**
	Department of Engineering Mechanics, School of Aerospace
	Tsinghua University, Beijing, China
	Supervisiors: Prof. Zeng-Yuan Guo & Prof. Qun Chen
Sept. 2009 - Jul. 2013	Bachelor of Engineering. **Engineering Mechanics**
	Tsien Excellence in Engineering Program
	Department of Engineering Mechanics, School of Aerospace
	Tsinghua University, Beijing, China
	Selected by the **Tsinghua Xuetang Talents Program**
Jun. 2010 - Aug. 2010	Tsinghua University - The Unviersity of Sydney Summer School
	The University of Sydney, Sydney, Australia

Research Interests

Phase field method simulation for frost growth;

Simulation and optimization of heat transfer and thermal systems;

Integrated energy system optimization using heat current method;

Research Experiences

July 2019 - present	Postdoctoral Researcher, SHIKAZONO Lab, Institute of Industrial Science
	The University of Tokyo

Awards

Nov. 2018	The Second Excellence Scholarship, by Tsinghua University
Nov. 2017	National Scholarship for Ph.D. students, by the Ministry of Education of China
Nov. 2016	IHI Corporation Scholarship, by Tsinghua University & IHI Corporation, Japan
Jun. 2016	Excellent Reader of Tsinghua Library, by Tsinghua University Library
Nov. 2015	Guanghua Scholarship for Excellence, by Tsinghua University
Jun. 2014	Excellent Reader of Tsinghua Library, by Tsinghua University Library
Nov. 2010 - Nov. 2012	Tsinghua Xuetang Scholarship, by Tsinghua University

References

Prof. Zeng-Yuan Guo (Ph.D. Supervisor)   demgzy@tsinghua.edu.cn
Department of Engineering Mechanics, Tsinghua University, Beijing, China
Prof. Xing Zhang   x-zhang@tsinghua.edu.cn
Department of Engineering Mechanics, Tsinghua University, Beijing, China
Prof. Qun Chen (Associate Ph.D. Supervisor)   chenqun@tsinghua.edu.cn
Department of Engineering Mechanics, Tsinghua University, Beijing, China

Teaching Experience

Fall 2014	Fundamental of Thermal Engineering, Department of Engineering Mechanics, Tsinghua University
Fall 2015	Fundamental of Thermal Engineering, Department of Engineering Mechanics, Tsinghua University
Fall 2016	Heat Transfer, Department of Engineering Mechanics, Tsinghua University
Fall 2017	Heat Transfer, Department of Engineering Mechanics, Tsinghua University
Fall 2018	Heat Transfer, Department of Engineering Mechanics, Tsinghua University

Professional Services

Reviewer for Journals:	Applied Energy, International Journal of Energy Research
Reviewer for Conference:	International Heat Transfer Conference (IHTC)
	International Conference of Applied Energy (ICAE)
Organization volunteer:	The 16th International Heat Transfer Conference, Beijing, 2018
	Annual Meeting of Heat and Mass Transfer Society of China, Beijing, 2016

Skills

Programming Languanges:	Python, C, MATLAB, Fortran
Scientific Software:	ANSYS, ANSYS Fluent, AutoCAD, Solidworks, Origin, Tecplot
Scientific Tools:	LaTeX, CPLEX, Adobe Illustrator, Git

Languages

English:	Fluent, efficient academic communication
Mandarin:	Mother tongue

Publication List

Journal Articles

[1] **Tian Zhao**, Di Liu, and Qun Chen. A collaborative optimization method for heat transfer systems based on the heat current method and entransy dissipation extremum principle. *Applied Thermal Engineering*, 146:635–647, 2019. DOI: [10.1016/j.applthermaleng.2018.10.016](https://doi.org/10.1016/j.applthermaleng.2018.10.016).

[2] **Tian Zhao**, Yu-Chao Hua, and Guo Zeng-Yuan. The principle of least action for reversible thermodynamic processes. *Entropy*, 20:542, 2018. DOI: [10.3390/e20070542](https://doi.org/10.3390/e20070542).

[3] Qun Chen and **Tian Zhao**. Heat recovery and storage installation in large-scale battery systems for effective integration of renewable energy sources into power systems. *Applied Thermal Engineering*, 122:194–203, 2017. DOI: [10.1016/j.applthermaleng.2017.04.076](https://doi.org/10.1016/j.applthermaleng.2017.04.076).

[4] **Tian Zhao**, Yong Min, Qun Chen, and Jun-Hong Hao. Electrical circuit analogy for analysis and optimization of absorption energy storage systems. *Energy*, 104:171–183, 2016. DOI: `10.1016/j.energy.2016.03.120`.

[5] **Tian Zhao** and Zeng-Yuan Guo. The duality of internal energy of ideal gas. *Science Bulletin*, 60(15):1355–1358, 2015. DOI: `10.1007/s11434-015-0854-4`.

[6] **Tian Zhao** and Qun Chen. Macroscopic physical meaning of entransy and its application. *Acta Physica Sinica*, 62(23):234401, 2013. DOI: `10.7498/aps.62.234401`.

[7] Zeng-Yuan Guo, **Tian Zhao**, and Yu-Chao Hua. Reply to the Comments on: Tian Zhao et al. The principle of least action for reversible thermodynamic processes and cycles, Entropy 2018, 20, 542, doi: 10.3390/e20070542. *Entropy*, 20:986, 2018. DOI: `10.3390/e20120986`.

[8] Jun-Hong Hao, Qun Chen, Xia Li, and **Tian Zhao**. A correction factor-based alternative thermal resistance formula for heat exchanger design and performance analysis. accepted by *Journal of Thermal Science*, 2019.

[9] Xi Chen, Qun Chen, Hong Chen, Ying-Gen Xu, **Tian Zhao**, Kang Hu, and Ke-Lun He. Heat current method for analysis and optimization of heat recovery-based power generation systems, 2019. accepted by *Energy*.

[10] Xi Chen, **Tian Zhao**, Meng-Qi Zhang, and Qun Chen. Entropy and entransy in convective heat transfer optimization: a review and perspective. *International Journal of Heat and Mass Transfer*, 137:1191–1220, 2019. DOI: `10.1016/j.ijheatmasstransfer.2019.04.017`.

[11] Yu-Chao Hua, **Tian Zhao**, and Zeng-Yuan Guo. Irreversibility and action of heat conduction process. *Entropy*, 20:206, 2018. DOI: `doi:10.3390/e20030206`.

[12] Yu-Chao Hua, **Tian Zhao**, and Zeng-Yuan Guo. Optimization of the one-dimensional transient heat conduction problems using extended entransy analyses. *International Journal of Heat and Mass Transfer*, 116:166–172, 2018. DOI: `10.1016/j.ijheatmasstransfer.2017.08.101`.

[13] Yu-Chao Hua, **Tian Zhao**, and Zeng-Yuan Guo. Transient thermal conduction optimization for solid sensible heat thermal energy storage modules by the Monte Carlo method. *Energy*, 133(15):338–347, August 2017. DOI: `10.1016/j.energy.2017.05.073`.

[14] Qun Chen, Jun-Hong Hao, and **Tian Zhao**. An alternative energy flow model for analysis and optimization of heat transfer systems. *International Journal of Heat and Mass Transfer*, 108:712–720, 2017. DOI: `10.1016/j.ijheatmasstransfer.2016.12.080`.

[15] **Tian Zhao**, Ti-Wei Xue, and Zeng-Yuan Guo. Symmetry of reversible thermodynamics. *accepted by Chinese Science Bulletin*. DOI: `10.1360/TB-2019-0131`.

[16] Zeng-Yuan Guo, **Tian Zhao**, and Ti-Wei Xue. The other half of the principle for heat-work conversion cycles: the theorem, principle and core physical quantity of reversed cycles. *Chinese Science Bulletin*, 64:600–610, 2019. DOI: `10.1360/N972018-00456`.

[17] Zeng-Yuan Guo, **Tian Zhao**, and Ti-Wei Xue. The entransy analysis for reversible thermodynamic cycles and its applications. *Chinese Science Bulletin*, 64:1–11, 2019. DOI: `10.1360/N972018-00865`.

[18] Zeng-Yuan Guo, **Tian Zhao**, and Ti-Wei Xue. The performance analysis of the reversed carnot cycle and the reversed p-V cycle. *Scientia Sinica Technologica*, 48:1–9, 2018. DOI: `10.1360/N092018-00081`.

[19] Ti-Wei Xue, **Tian Zhao**, and Zeng-Yuan Guo. Work entropy and work exergy. *Chinese Science Bulletin*, 64:1309–1318, 2019. DOI: `10.1360/N972018-00945`.

[20] Qun Chen, Jun-Hong Hao, Rong-Huan Fu, Yi-Fei Wang, Si-Yu Zhao, and **Tian Zhao**. Entransy-based power flow method for analysis and optimization of thermal systems. *Journal of Engineering Thermophysics*, 38:1376–1383, 2017.

[21] **Tian Zhao** and Qun Chen. A new perspective of analysis and optimization for absorption thermal energy storage system based on entransy theory. *Energy Procedia*, 75:2074–2079, 2015. DOI: `10.1016/j.egypro.2015.07.297`.

Chapters

[22] **Tian Zhao** and Qun Chen. *Application of heat current method in the analysis and optimization of energy storage systems.* In Qun Chen and Jun-Hong Hao. *The Heat Current Method for Thermal Systems.* Science Press, Beijing, China, 2019, pages 1–1.

Conference Papers

[23] Ke-Lun He, Qun Chen, **Tian Zhao**, and Xi Chen. Network heat transfer and its applications in thermal system analyses and optimization. In September 2019. 16th UK Heat Transfer Conference, East Midlands Conference Centre, University of Nottingham, UK.

[24] Qun Chen and **Tian Zhao**. The heat current method based modeling and optimization of an solar-assisted double-effect absorption chiller for residential houses. In July 2019. 13th International Conference on Energy Sustainability, Bellevue, Washington, United States of America.

[25] Xi Chen, **Tian Zhao**, and Qun Chen. The heat current method for analysis and optimization of thermal systems with phase change of fluids. In July 2019. ASME 2019 POWER Conference, Salt Lake City, Utah, United States of America.

[26] **Tian Zhao**, Ti-Wei Xue, and Zeng-Yuan Guo. Entransy based analysis and optimization for single-effect absorption heat pumps. In 32th International Conference on Efficiency, Costs, Optimization, Simulation and Environmental Impact of Energy Systems (ECOS 2019), Wrocław, Poland, June 2019.

[27] Ti-Wei Xue, **Tian Zhao**, and Zeng-Yuan Guo. The theorem of a reversed cycle and its core physical quantity—work entropy. In 32th International Conference on Efficiency, Costs, Optimization, Simulation and Environmental Impact of Energy Systems (ECOS 2019), Wrocław, Poland, June 2019.

[28] **Tian Zhao** and Zeng-Yuan Guo. The entransy based analysis of the operation principle of the absorption heat pump. In 16th International Heat Transfer Conference 2018, Beijing, China, August 2018.

[29] **Tian Zhao** and Qun Chen. An integrated energy system with large-scale electrical and thermal energy storage devices. In ASME Energy Storage Forum, Charlotte, North Carolina, United States of America, June 2017.

[30] **Tian Zhao** and Zeng-Yuan Guo. Least action principle for reversible thermodynamic processes. In 1st Asian Conference on Thermal Sciences, Jeju Island, Korea, March 2017.

[31] Yu-Chao Hua, **Tian Zhao**, and Zeng-Yuan Guo. Least action principle for linear transport processes. In 1st Asian Conference on Thermal Sciences, Jeju Island, Korea, March 2017.

[32] **Tian Zhao** and Zeng-Yuan Guo. Energy principles in thermodynamics. In 14th Joint European Thermodynamics Conference, Budapest, Hungary, May 2017.

[33] **Tian Zhao** and Qun Chen. A new perspective of analysis and optimization for absorption thermal energy storage system based on entransy theory. In International Conference of Applied Energy, Abu Dhabi, United Arab Emirates, March 2015.

[34] **Tian Zhao** and Qun Chen. The macroscopic physical intepretation of entransy and its applications. In The Annual Academic Conference of the Chinese Society of Engineering Thermophysics, Chongqing, China, September 2013.

Patents

[35] Qun Chen and **Tian Zhao**. The energy storage system integrating the electrical and thermal energy storage, 2016. Authorized Patent.

[36] Qun Chen, Xi Chen, Hong Chen, Ying-Gen Xu, Xian-Yun Xin, **Tian Zhao**, and Wei Shao. A solution method for the integrated mathematical model of thermodynamic systems based on divide and conquer approach, 2018. Patent in Application.

[37] Wei Shao, Xi Chen, **Tian Zhao**, and Qun Chen. Heat current model of solid granule cooling processes in moving packed beds and its applications. submitted to *Applied Thermal Engineering*, 2018.

[38] **Tian Zhao**, Xi Chen, and Qun Chen. The heat current method based modeling and optimization of a single effect absorption chiller. submitted to *Applied Thermal Engineering*, 2019.

[39] **Tian Zhao**, Di Liu, and Qun Chen. Synergistic and reliable optimization for heat transfer systems employing elliptical tubes based on heat current method and entransy dissipation extremum principle. *submitted to* Science China Technological Science.

[40] **Tian Zhao**, Xi Chen, and Qun Chen. The heat current method based modeling and optimization of a solar-assisted double effect absorption chiller combined with thermal energy storage for residential house. submitted to *Energy Conversion and Management*, 2019.

[41] Xi Chen, **Tian Zhao**, and Qun Chen. The divide-and-conquer solution strategy for the analysis and optimization of thermal systems based on the heat current method. in preparation, 2019.