

MR. RUIQING DU

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EDUCATIONAL BACKGROUND

The University of Hong Kong

Sept. 2020 – Present

- Ph.D. Student
- **Major:** Urban Climate and Building Energy Efficiency

Chongqing University,

Sept. 2017 – Jun. 2020

- Master's Degree
- **Major:** Heating, Gas supply, Ventilation and Air Conditioning

Chongqing University,

Sept. 2013 – Jun. 2017

- Bachelor's Degree
- **Major:** Building Environment and Energy Engineering

National University of Singapore,

Dec. 2018 – Jun. 2019

- Visiting master (Certificate)
- **Programme:** Smart Building Material
- **Research topic:** energy system, radiative cooling

ACADEMIC ACHIEVEMENTS

RESEARCH

12/2018-Present **Design, Development and Optimization of Novel Multi-Functional Composite Radiative Cooling Coating for Singapore's Built Environment**

- **Purposes:** to develop a novel nanoparticle-based liquid composite radiative cooling nanocoating to: (1) achieve high-performance radiative cooling in daytime & nighttime, (2) reduce AC energy consumption for building sector in Singapore, (3) mitigate Urban Heat Island (UHI) effect in Singapore and (4) improve human thermal comfort.
- **Duties involved:** optical simulations related to radiative cooling using Optiwave software.

07/2018-Present **Investigation on the Fresh Air System with Latent Heat Energy Storage based on Renewable Energy**

- **Purposes:** to study the heat charge and discharge characteristics of low temperature phase change materials by using the renewable energy as cold & heat sources, namely the solar energy in winter and nocturnal radiative cooling in summer to: (1) pre-heat & pre-cool the outdoor fresh air, and increase solar energy efficiency in solar-poor areas, thereby reduce the energy consumption of air-conditioner system, (2) make a breakthrough in the utilization of renewable energy, so as to establish a relevant foundation for the energy-saving development of environment control system.

- **Duties involved:** posed the research topic and wrote the proposal; completed the experiment, data processing and numerical simulation.
- **Outcomes:** the research result was awarded a national patent.

05/2018-Present **Investigation on Heat Transfer Mechanism of Prefabricated Horizontal Buried Pipe with the Interaction of Nanofluids and Phase Change Materials**

- **Purposes:** to investigate the heat transfer performance of ground heat exchangers (GHEs) with nanofluid as heat carrier and PCM in assembled heat exchanger device, especially their interaction, to enhance the heat transfer efficiency and optimize the system; to achieve an innovated method to calculate and evaluate the heat transfer performance of GHEs with the nanofluid and phase change material, which could be the foundation theory and method to break through the technical bottleneck of the ground source heat pump systems.
- **Duties involved:** wrote the research proposal, completed the experiment of using nanofluid in ground heat exchanger, data processing and numerical simulation using discrete phase model (DPM).
- **Expected Outcomes:** (1) it will be my graduation dissertation; (2) to publish a SCI-collected paper as the first author.

09/2017-Present **Research on Evaluation and Modeling Method to Thermal Energy Storage Maladjustment of Ground Source Heat Pump System in Hot Summer and Cold Winter Area**

- **Purposes:** (1) to solve the academic problem of how thermal imbalance ratio influences GSHP system with vertical boreholes; (2) to achieve the calculation method and evaluation system of thermal energy storage maladjustment with thermal imbalance ratio.
- **Duties involved:** completed the experiment, data processing and numerical simulation.
- **Outcomes:** published two SCI-collected papers as the third author.

03/2018-08/2018 **Investigation on the Melting of Nanoparticle-enhanced PCM in Latent Heat Energy Storage Unit with Spiral Coil Heat Exchanger**

- **Methodology:** (1) copper nanoparticles were added into paraffin to enhance the heat transfer rate of a latent heat storage unit using a coil heat exchanger, (2) a three-dimensional numerical model was built to simulate the melting process of phase change material, and it was well validated against the experimental data.
- **Conclusion:** (1) the application of nanoparticle-enhanced PCM in the latent heat storage unit can significantly enhance heat transfer, (2) Even if the bottom area occupied less than 5% of the entire volume, it took nearly 24.3% of the total melting time to melt the pure PCM in this part, and this figure was 1920 s longer than that spent by nano-enhanced PCM, (3) The proposed optimum inlet heat transfer fluid temperature range could contribute to higher energy efficiency.
- **Duties involved:** paper writing, revising and submitting; completed the experiment, data processing and numerical simulation.
- **Outcomes:** published a SCI-collected paper as the first author in 2018.

09/2015-06/2016 **Experimental and Numerical Investigation on the Energy Efficiency Enhancement of Wind Power Generator Using a Guiding Device**

- **Methodologies:** experimentally and numerically investigated the main factors affecting the rotor speed of the wind power generator; presented a kind of flow guiding device to improve the utilization rate of wind power based on the effect of wind field on the rotor speed of the wind power generator.
- **Duties involved:** paper writing, revising and submitting; completed the experiment, data processing and numerical simulation.
- **Outcomes:** published a relevant conference paper as the first author, a national patent.

PAPERS

- [1] Du, R., Li, W., Xiong, T., Yang, X., Wang, Y., and Shah, K.. Numerical investigation on the melting of nanoparticle-enhanced PCM in latent heat energy storage unit with spiral coil heat exchanger [J]. Building Simulation, 2019,12(5): 869-879.
- [2] Du, R., Jiang, D., Wang, Y.. Numerical investigation of the effect of nanoparticle diameter and sphericity on the thermal performance of geothermal heat exchanger using nanofluid as heat transfer fluid [J]. Energies, 2019, 13(7): 1653.
- [3] Du, R., Jiang, D., Wang, Y., Shah, K.. An experimental investigation of CuO/water nanofluid heat transfer in geothermal heat exchanger [J]. Energy and Buildings, 2020.
- [4] Du, R., Jiang, D., Wang, Y.. Experimental Investigation on Thermal Performance of Double-U-tube Heat Exchanger Using CuO/water Nanofluid as Heat Transfer Fluid [J]. E3S Web of Conference, 2020,01020.
- [5] Du, R., Xu B., Zhang Y., Xiong T., Wang Y.. Experimental and numerical research of the improvement of wind power generator energy efficiency using guiding device [C]. National Conference on Heating, Ventilation, Air-conditioning & Refrigeration, China, 2016.
- [6] Li, W., Li, X., Du, R., Wang, Y., and Tu, J.. Experimental investigations of the heat load effect on heat transfer of ground heat exchangers in a layered subsurface [J]. Geothermics, 2019, 77: 75-82.
- [7] Li W., Li X., Wang, Y., Du, R., Tu, J.. Effect of the heat load distribution on thermal performance prediction of ground heat exchangers in a stratified subsurface [J]. Renewable Energy, 2019, 141:340-348.
- [8] Peng, Y., Wang, Y., and Du, R.. The Effect of Nanofluid to Vertical Single U-tube Ground Heat Exchanger[C]. The 4th International Conference on Building Simulation and Optimization (BSO), Cambridge, UK: 11-12 September 2018

CONFERENCE

- International Conference on Energy and Environment of Residential Buildings Registration (8th), New Zealand, Oral presentation, 2018.

PATENTS

- [1] “A new type of flow guiding device to improve wind energy utilization rate”, **Du Ruiqing**, Xu Bo, Zhang Yue, Xiong Teng, Wang Yong, National patent, 2016.
- [2] “A new type of grease separator with low pressure-loss and high performance”, **Du Ruiqing**, Weng Miaocheng, National patent, 2015.
- [3] “A new fresh air preheating device”, Yong Wang, Ma Ying, Wu Weilan, Liu Yong, **Du Ruiqing**, Wang Suo, Li Jing, Gao Ling, 2018.

ACHIEVEMENTS**SCHOLARSHIPS**

10/2019	National Scholarship
12/2019	Tanglixin Scholarship
10/2018	Enterprise Sponsor Scholarship for graduate students of Chongqing University
09/2019	Scholarship of Class A for graduate students of Chongqing University
09/2018	Scholarship of Class A for graduate students of Chongqing University
09/2017	Freshman Scholarship for graduate students of Chongqing University
06/2017	Sander Scholarship for undergraduate students of Chongqing University
2016-2017	Integrated Excellent Scholarship for undergraduate students of Chongqing University
2015-2016	Integrated Excellent Scholarship for undergraduate students of Chongqing University (2 nd)
2015-2016	Integrated Excellent Scholarship for undergraduate students of Chongqing University (1 st)
2014-2015	Integrated Excellent Scholarship for undergraduate students of Chongqing University

AWARDS/HONOURS

10/2019	Second Prize of the 6 th National Graduate Energy Equipment Competition
08/2016	Artificial Environment Discipline Award and Medal for Distinguished Students from National Higher Educational Institutions
05/2020	Excellent Graduate Student of Chongqing
01/2020	Excellent Graduate Student of Chongqing University
01/2019	Excellent Graduate Student of Chongqing University
01/2019	Second Prize of the 8th “Science and Smart Cup” Innovation and Entrepreneurship Contest of Chongqing
02/2016	Excellent Paper in Energy Conservation and Discharge Reduction Project in Chongqing
12/2017	Second Prize in "FLTRP Institute Cup" English Speech Contest
10/2018	Excellent Postgraduate Student of Chongqing University
11/2017	Second Prize of Graduate Smart City Creative and Design Competition of Chongqing University
01/2019	Second Prize of the 6th "HACH City and Environment Cup" Academic Forum of Chongqing University
06/2017	Outstanding Undergraduate Graduation Thesis
12/2016	Advanced individual of Chongqing University
10/2015	The Outstanding Award of the 15th “Challenge Cup” Extracurricular Academic Science and Technology Works Contest
11/2013	The Third Prize of “Science and Technology Cup” Competition of Chongqing University

OTHER ACTIVITIES

Science and Technology Association of Graduate Student, Chongqing University,

11/2017-07/2018

Position: Director of the Project Department
