

Haein Jung, Ph.D.

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Employment

- 2026 – Present **Postdoctoral Researcher**, Brown University, CRUNCH group.
Research focus: thermal-fluid systems, scientific machine learning, and physics-based modeling.
- 2025 – 2026 **Postdoctoral Researcher**, Gwangju Institute of Science and Technology (GIST).
Research on laser thermal-fluid system design and high-performance energy systems.

Education

- 2019 – 2025 **Ph.D. in Mechanical and Robotics Engineering**, Gwangju Institute of Science and Technology (GIST), South Korea.
Dissertation: *Hydrodynamic Instabilities and Heat Transfer Behavior of Two-Phase Flow Boiling in Rectangular Microchannels and Concentric Annuli*.
- 2017 – 2019 **M.S. in Aerospace and Mechanical Engineering**, Korea Aerospace University, South Korea.
Thesis: *Chaotic advection in a groove-embedded partitioned pipe mixer: application to crossflow filtration*.
- 2010 – 2017 **B.S. in Mechanical Engineering**, Korea Aerospace University, South Korea.

Research Experience

- 2024–2026 **30 kW Airborne Liquid-Immersion Solid-State Laser Thermal Management**
Agency for Defense Development (ADD), Korea. Experimental and computational analysis of heat transfer, pressure drop, thermal stress, and optical performance.
- 2019–2024 **540 kW Ultra-Fast EV Charging Cable Thermal Management**
Korea Electric Power Corporation (KEPCO), Korea. Experimental investigation of subcooled boiling heat transfer, pressure drop, CHF, and flow instability.
- 2017–2019 **Crossflow Filtration Fouling Reduction**
Computational investigation of chaotic mixing, pressure drop, and fouling mitigation.

Research Publications

Journal Articles

- 1 **H. Jung** and S.-H. Lee, “Experimental investigation of subcooled density-wave oscillations in concentric annulus,” *International Journal of Heat and Mass Transfer*, vol. 268, p. 128 967, 2026.
- 2 H. Noh, **H. Jung**, M. Kwon, and S.-H. Lee, “Comparison of subcooled flow boiling in concentric annuli with bare and finned surfaces,” *Applied Thermal Engineering*, vol. 258, p. 124 722, 2025.
- 3 **H. Jung** and S.-H. Lee, “Experimental investigation into thermal characteristics of subcooled flow boiling in horizontal concentric annuli for cooling ultra-fast electric vehicle charging cables,” *Case Studies in Thermal Engineering*, vol. 62, p. 105 122, 2024.
- 4 **H. Jung**, H. Noh, and S.-H. Lee, “Experimental and photographic investigation into horizontal subcooled flow boiling in concentric annuli for cooling system of ultra-fast electric vehicle charging cables,” *International Communications in Heat and Mass Transfer*, vol. 159, p. 108 059, 2024.
- 5 **H. Jung** and S.-H. Lee, “Mechanistic model to predict oscillating frequency of flow boiling in large length-to-diameter ratio micro-channel heat sinks,” *International Journal of Heat and Mass Transfer*, vol. 215, p. 124 473, 2023.
- 6 **H. Jung**, J.-M. Park, S.-Y. Jung, T.-G. Kang, and K.-H. Ahn, “Flow and mixing characteristics of a groove-embedded partitioned pipe mixer,” *Korea-Australia Rheology Journal*, vol. 32, pp. 319–329, 2020.
- 7 S.-Y. Jung, **H. Jung**, T.-G. Kang, and K.-H. Ahn, “Fouling mitigation in crossflow filtration using chaotic advection: A numerical study,” *AIChE Journal*, vol. 66, no. 1, e16792, 2020.
- 8 **H. Jung**, S.-Y. Jung, T.-G. Kang, and K.-H. Ahn, “Numerical study on the mixing in a barrier-embedded partitioned pipe mixer (bppm) for non-creeping flow conditions,” *Korea-Australia Rheology Journal*, vol. 30, pp. 227–238, 2018.

Skills

Experimental	■	Flow boiling heat transfer test module design, cooling loop construction, flow visualization, data acquisition systems, and power supply setup.
Theoretical	■	Mechanistic modeling of flow boiling instability, including density wave oscillation analysis, heat transfer, pressure drop, and CHF prediction.
Computational	■	CFD-based thermal-fluid analysis, multiphysics simulation, and FEM-based thermal stress analysis.
Scientific Computing	■	Python, MATLAB, Physics-informed neural networks, and data-driven modeling.