



Exponent[®]
Engineering & Scientific Consulting

Tony Kim, Ph.D.

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Professional Profile

Dr. Kim specializes in thermo-fluid systems, energy efficiency, and control-oriented engineering, applying first-principles modeling to support complex thermal and energy systems, including those operating in mission-critical environments. He has strong expertise in system-level modeling, data analysis, experimental validation, and numerical simulation, with hands-on experience using MATLAB, Python, and CFD tools to analyze and optimize thermal-fluid performance. His work integrates data-driven analysis with simulation and physical testing to develop scalable solutions that improve efficiency, reliability, and system uptime.

Prior to Exponent, Dr. Kim earned his Ph.D. in Mechanical Engineering from Texas A&M University, where his research focused on industrial compressed air storage systems. He has supported projects spanning manufacturing, HVAC, and high-reliability applications, and collaborates closely with multidisciplinary teams to translate analytical insight into deployable engineering solutions.

Academic Credentials & Professional Honors

Ph.D., Mechanical Engineering, Texas A&M University, 2025

M.S., Mechanical Engineering, Sogang University, 2019

B.S., Mechanical Engineering, Sogang University, 2017

Linda D. & Joe R. Fowler Fellowships from Texas A&M University US, 2024-2025

National winner of the bonus prize in EnergyTech Up Event hosted by Department of Energy, US, 2024

Association of Energy Engineers Scholarship, US, 2024

Best Paper Award at 10th National Congress on Fluids Engineering (NCFE), Republic of Korea, 2017

Summa Cum Laude in B.S. degree from Sogang University, Republic of Korea, 2017

Academic Excellence Scholarship from Sogang University, Republic of Korea, 2011 – 2016

Honor of College of Engineering from Sogang University, Republic of Korea, 2015

Prior Experience

Graduate Research Assistant, Energy Efficiency Control Optimization Lab at Texas A&M University, 2020 – 2025

Center Lead Energy Engineer, Industrial Training and Assessment Center (ITAC), 2020 – 2025

Advanced Technology Co-op, Lennox International, 2025

Planetary Protection Intern, NASA GSFC (KBR Inc.), 2023

Graduate Research Assistant, Fluid & Thermal Multiphysics Lab at Sogang University, 2017 – 2019

Professional Affiliations

American Society of Mechanical Engineers (ASME), Member, 2024 – Present

Association of Energy Engineers (AEE), Member, 2024 – Present

Industrial Training & Assessment Center (ITAC), Member, 2020 – 2025

Languages

Korean

Publications

Terrill TJ, Kim T, Rasmussen BP. [Feasibility of using thermal response methods for nonintrusive compressed air flow measurement](#). Flow Measurement and Instrumentation 2021; 77:101869.

Presentations

Kim T, Jung E, Kang S. An analysis of spatially varying turbulent Prandtl number in a wedged channel. Oral presentation, 10th National Congress on Fluids Engineering, Republic of Korea, 2018.

Kim T, Jung E, Lee W, Kang S. An analysis of turbulent statistics related to spatially varying turbulent Prandtl number. Oral presentation, Korean Society of Mechanical Engineering Conference, Republic of Korea, 2017.

Project Experience

Industrial Energy Systems & Compressed Air Optimization

Developed and evaluated control and energy storage strategies for industrial compressed air systems serving manufacturing facilities with intermittent demand. Applied thermodynamic modeling, control logic development in MATLAB/Simulink, and experimental testing using DAQ hardware and flow/pressure sensors to reduce energy consumption while maintaining stable operation during production transitions. Achieved up to 50% energy savings and less than 4 seconds of recovery time through integrated simulation and hardware validation.

Manufacturing Energy Assessment

Led on-site energy assessments for manufacturing facilities as part of a U.S. Department of Energy-funded program. Conducted system-level evaluations of compressed air, HVAC, and process energy use and developed practical efficiency recommendations. Contributed to over \$1.5M in implemented energy savings through data analysis, engineering calculations, and technical reporting.

HVAC Systems & Thermal Controls

Supported development of control frameworks for commercial HVAC and heat pump systems. Conducted modeling and data analysis to assess system performance under varying operating conditions. Contributed to improving control logic robustness and alignment with regulator and testing requirements.

Reliability & Sensitivity Analysis of Thermal Systems

Performed statistical sensitivity and uncertainty analysis on spacecraft thermal and entry systems, supporting mission-critical operations. Evaluated multiple system parameters to identify key contributors to performance and failure risk. Supported test planning and model refinement through data-driven insights and cross-disciplinary collaboration.

CFD & Heat Transfer Modeling

Performed computational fluid dynamics (CFD) analyses using Fortran, MATLAB, and Tecplot to improve heat transfer prediction accuracy of Reynolds Averaged Navier-Stokes (RANS) simulations in turbulent flows. Developed and implemented a turbulent Prandtl number model and validated it against benchmark Direct Numerical Simulation (DNS) data through post-processing and statistical analysis.

Additional Education & Training

ISO 50001 Certified Practitioner in Energy Management Systems (50001 CP EnMS) by Georgia Institute of Technology, 2024