

Donghun Kang, Ph.D.

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Enthusiastic Aerodynamics/CFD Engineer

I am a self-motivated and enthusiastic aerodynamics engineer with over 9 years of experience in computational fluid dynamics, over 5 years in aeroacoustics, and more than 1 year in multidisciplinary design optimization—each encompassing theoretical development, numerical implementation, and practical application. I also have more than 2 years of industry experience. Since October 2024, I have been working as a postdoctoral researcher at UC San Diego.

Education

University of California, Davis

Ph.D. in Mechanical and Aerospace Engineering, Advisor: Dr. Seongkyu Lee
GPA: 3.91/4.00

Davis, USA

Sep 2020 – Sep 2024

Korea Advanced Institute of Science and Technology (KAIST)

M.S. in Aerospace Engineering, Advisor: Dr. Oh Joon Kwon
GPA: 3.88/4.00

Daejeon, South Korea

Mar 2016 – Feb 2018

Korea Aerospace University

B.S. in Aerospace Engineering
GPA: 3.87/4.00 – Ranked 2nd out of 180

Goyang, South Korea

Mar 2010 – Feb 2016

Professional Appointments

Postdoctoral Researcher

Department of Mechanical and Aerospace Engineering at University of California, San Diego San Diego, USA
Oct 2024 – Present

Graduate Research Assistant

Department of Mechanical and Aerospace Engineering at University of California, Davis Davis, USA
Sep 2020 – Sep 2024

Aerodynamics Engineer

Aircraft Aerodynamics Branch at Agency for Defense Development Daejeon, South Korea
May 2018 – Sep 2020

Software and Analysis Techniques

Programming Languages : Python (Daily for research), Matlab (Daily for research), C++ (Source code modification), Fortran (Source code modification), and MPI libraries (Proficient)

CAD Software : CATIA (5 years) and OpenVSP for geometry parametrization (1.5 years)

Flow Solver : OpenFOAM (5 years), DAFoam&SU2 (1.5 years), Star-CCM+ (2.5 years), Fortran-based home-grown FVM flow solver (2 years), and CAMRAD-II (2 years)

Visualization : Tecplot, Paraview, and FieldView, all of which are coupled with macro scripts to extract images of unsteady flow motions every time step

Acoustic Code : PSU-WOPWOP (FW-H), Amiet's theory, and Brooks, Pope, and Marcolini (BPM) model

Optimization : Computational System Design Language (CSDL), modopt, Mphys/OpenMDAO, MACH-Aero Framework (pyGeo and IDWarp), and Meshing (Gmsh, Pointwise, and pyHyp)

Data Analysis : Signal processing—wavelet transform and wavenumber-frequency spectrum. Data-driven modeling—spectral proper orthogonal decomposition (SPOD) and dynamic mode decomposition (DMD)

Industry and Research Experience

Postdoctoral Researcher at UC San Diego

Oct 2024 – Present

Large-Scale Design Optimization Laboratory (PI: Dr. John T. Hwang)

San Diego, USA

- Implemented Farassat Formulation 1A of Ffowcs Williams-Hawkings acoustic analogy using Computational System Design Language (CSDL; home-grown open source code) for engineering design optimization
- Established a modular aerodynamic shape optimization framework (CSDL-CFD (DAFoam) interface) with key components of geometry parametrization, mesh deformation, flow solver, adjoint solver, and optimizer
- Implemented and tested least-squares Petrov-Galerkin reduced-order model in SU2 for rapid shape optimization of a generic aircraft

Graduate Research Assistant at UC Davis

Sep 2020 – Sep 2024

Computational Flow Physics and Aeroacoustics Laboratory

Davis, USA

- Investigated flow-induced noise using wall-resolved large-eddy simulations (LES), advanced time-frequency methods, and data-driven techniques: demarcating the role of hydrodynamic and acoustic pressures, boundary-layer tripping effects on radiated noise, and wavelet filtering
- Developed the spectral tool for acoustic analysis: cross-spectrum method
- Reduced up to 5.5 dBA in sound pressure levels through flow misalignment, and 2.0 dBA through trailing-edge morphing, while improving aerodynamic performance for the morphed airfoil

Visiting Researcher at Stanford University

Jul 2022 – Aug 2022

The eighteenth biennial Summer Program of the Center for Turbulence Research (CTR)

Stanford, USA

- Worked on the topic titled, “Airfoil trailing-edge noise source identification using large-eddy simulation and wavelet transform.” (Hosts: Prof. Sanjiva. K. Lele and Dr. Davy Brouzet)
- Conducted collaborative works with program participants specialized in turbulence and relevant multi-physics involving wavelet-denoising method and pressure decomposition, and published the research report

Engineer at Agency for Defense Development—South Korean government agency

May 2018 – Sep 2020

Aircraft Aerodynamics Branch

Daejeon, South Korea

- Designed control vanes used for thrust vectoring and rolling and yawing maneuvering control through computational fluid dynamics (Star-CCM+) and wind tunnel testing (KR Patent 10-2022-0013554)
- Performed stability & control (S&C) and 6-DOF aerodynamic analysis of a vertical take-off landing (VTOL) aircraft and fan-blade system during level flight conditions through computational fluid dynamics and wind tunnel testing (collaborated with DLR-NWB)
- Conducted numerical simulations of VTOL configurations in transitional flight conditions to find aerodynamic similarities between forward flight speed and a blade pitch angle of ducted fan

Extracurricular Experience and Military Service

- Intern at University of Southern California (USC) Jun 2014 – Aug 2014
– Conducted research internship on the title of “experiment on duck-bone carbon composite” under the guidance of Dr. Steven Nutt
- Undergraduate rocket research team at Korea Aerospace University Mar. 2010 – Jan. 2011
– Designed and manufactured a solid-propellant rocket [\[link\]](#)
- Republic of Korea Army (mandatory service) – Tactical Signal Corps Feb. 2011 – Nov. 2012
– Completed an 7-night, 9-day, 400 km tactical march

Journal Publications

- [J1] **DH. Kang** and S. Lee, “Effect of Misaligned Flow on Trailing-edge Noise,” *Journal of Sound and Vibration*, Vol. 611, pp. 119102, 2025. [\[link\]](#)
- [J2] **DH. Kang** and S. Lee, “Role of Hydrodynamic and Acoustic Pressures in Trailing-edge Noise Using Numerical and Analytical Approaches,” *Physical Review Fluids*, Vol. 10, No. 3, pp. 034609, 2025. [\[link\]](#)
- [J3] **DH. Kang** and S. Lee, “Effect of Trailing-edge Curvature on Airfoil Noise Source and Radiation Characteristics,” *Physics of Fluids*, Vol. 37, No. 3, pp. 035134, 2025. [\[link\]](#)
- [J4] **DH. Kang** and S. Lee, “Cross-Spectrum Method for Acoustic Source Identification and Visualization of Airfoil Noise,” *Aerospace Science Technology*, Vol. 151, pp. 109278, 2024. [\[link\]](#)
- [J5] **DH. Kang** and S. Lee, “Aerodynamic and Aeroacoustic Effects of Different Transition Mechanisms on an Airfoil,” *AIAA Journal*, Vol. 62, No. 4, pp. 1517–1535, 2024. [\[link\]](#)
- [J6] **DH. Kang**, S. Lee, D. Brouzet, and S. K. Lele, “Wavelet-based Pressure Decomposition for Airfoil Noise in low Mach Number Flows,” *Physics of Fluids*, Vol. 35, pp. 075112, 2023. [\[link\]](#)
- [J7] **DH. Kang**, J.W. Yim, and H.C. You, “Numerical Investigation of Aerodynamic Characteristics of a Ducted Fan-Vane Configuration and Improvement of Control Performance in Hover,” *Journal of Korean Society of Aeronautical and Space Sciences*, Vol. 49, No. 3, pp. 221–231, 2021. [\[link\]](#)
- [J8] **DH. Kang** and O.J. Kwon, “Numerical Study about Buffet Characteristics and Attenuation of Vertical Tail at High Angles of Attack,” *International Journal of Aeronautical and Space Sciences*, Vol. 21, pp. 315–328, 2019. [\[link\]](#)

Patent

- J.W. Yim, **DH. Kang**, K.M. Kim, “Ducted Fan with Vanes,” KR Patent 10-2022-0013554, issued August 10, 2022. [\[link\]](#)

Conference and Presentations

- [C1] **DH. Kang** and S. Lee, “Aerodynamic and Aeroacoustic Investigations of a NACA 0018 Airfoil with Morphed Trailing Edges,” AIAA SciTech Forum, Orlando, FL, Jan 8-10, 2025. [\[link\]](#)
- [C2] **DH. Kang** and S. Lee, “Aeroacoustic Study of Morphed Trailing-Edge Airfoils Using Large-Eddy Simulations,” 12th International Conference on Computational Fluid Dynamics, Kobe, Japan, July 14-19, 2024.
- [C3] **DH. Kang** and S. Lee, “Numerical and Analytical Investigations on Airfoil Noise Reduction with a Sweep Angle,” 30th AIAA/CEAS Aeroacoustics Conference, Rome, Italy, June 4-7, 2024. [\[link\]](#)
- [C4] **DH. Kang** and S. Lee, “A New Acoustic Source Identification and Visualization Method for Airfoil Noise Using Large-Eddy Simulations,” AIAA SciTech Forum, Orlando, FL, Jan 8-12, 2024. [\[link\]](#)
- [C5] **DH. Kang** and S. Lee, “A Revisit of Amiet’s Trailing-edge Noise Theory through Large-Eddy Simulations,” AIAA Aviation Forum, San Diego, CA, June 12-16, 2023. [\[link\]](#), **(Selected as one of the top 5 best student papers in the aeroacoustics conference)**.
- [C6] **DH. Kang** and S. Lee, “On the Effect of Boundary-layer Tripping for Trailing-edge Noise Predictions,” AIAA SciTech Forum, National Harbor, MD, Jan 23-27, 2023. [\[link\]](#)
- [C7] S. Lee, **DH. Kang**, D. Brouzet, and S. K. Lele, “Airfoil Trailing-Edge Noise Source Identification Using Large-Eddy Simulation and Wavelet Transform,” Proceedings of the 2022 Center for Turbulence Research Summer Program, 2022. [\[link\]](#)
- [C8] **DH. Kang** and S. Lee, “Assessment of Wavelet-based Separation Algorithms on Turbulent Boundary Layer Trailing-edge Noise Prediction,” 11th International Conference on Computational Fluid Dynamics, Maui, Hawaii, July 11-15, 2022. [\[link\]](#)
- [C9] **DH. Kang** and S. Lee, “Application of Wavelet Analysis to Trailing-edge Noise,” 28th AIAA/CEAS Aeroacoustics Conference, Southampton, UK, June 14-17, 2022. [\[link\]](#)