Donghun Kang, Ph.D.

University of California, San Diego
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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 Davis, USA
Ph.D. in Mechanical and Aerospace Engineering, Advisor: Dr. Seongkyu Lee *Sep 2020 – Sep 2024*
GPA: 3.91/4.00

Korea Advanced Institute of Science and Technology (KAIST) Daejeon, South Korea
M.S. in Aerospace Engineering, Advisor: Dr. Oh Joon Kwon *Mar 2016 – Feb 2018*
GPA: 3.88/4.00

Korea Aerospace University Goyang, South Korea
B.S. in Aerospace Engineering *Mar 2010 – Feb 2016*
GPA: 3.87/4.00 – Ranked 2nd out of 180

Professional Appointments

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

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

Aerodynamics Engineer Daejeon, South Korea
Aircraft Aerodynamics Branch at Agency for Defense Development *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

- Society of Rocket Research (SRS) 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**, JW. Yim, and HC. 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 OJ. 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

- JW. Yim, **DH. Kang**, KM. 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]