Exponent®

Engineering & Scientific Consulting

Walter Arias

Senior Associate | Thermal Sciences
Natick
wariasramirez@exponent.com

Professional Profile

Dr. Arias is a mechanical engineer in Exponent's Thermal Science Practice, consulting primarily in the areas of thermo-fluid processes, aeroacoustics, and failure analysis. His areas of expertise encompass computational fluid dynamics, sensitivity analysis, aeroacoustics, and statistical analysis. Dr. Arias has worked in simulating industrial processes such as ventilation systems in confined spaces, stirred vessels, and gas dispersion, using commercial packages including Star-CCM+.

During his time at Exponent, Dr. Arias has utilized multi-dimensional modelling to assist in failure analysis for investigations related to fire, explosion, and gas dispersion, as well as the characterization of newly designed devices, including specialized catheters and fans for consumer electronics. Prior to joining Exponent, Dr. Arias graduated with his Ph.D. from the University of Maryland, where he developed a new methodology to aid in shape optimization and uncertainty quantification. This new method allows the use of high-fidelity models, like the large eddy simulation (LES), to predict the change in a quantity of interest when a design parameter changes. Dr. Arias graduated with his M.Sc. from the University of Campinas, Brazil, where he designed and analyzed numerical experiments to characterize aerodynamic noise around wings. Before graduate school, Dr. Arias worked as a Reliability and Project Engineer where he helped in determining the integrity and reliability of physical assets for clients in the oil & gas and power generation industries.

Dr. Arias is proficient at coding in Fortran, C++, Python, MATLAB, parallelized programming languages like MPI (Message Passing Interface) and Open-MP.

Academic Credentials & Professional Honors

Ph.D., Mechanical Engineering, University of Maryland, College Park, 2022

M.Sc., Mechanical Engineering, University of Campinas, Brazil, 2016

B.Sc., Mechanical Engineering, National University of Colombia, Medellin, 2011

Prior Experience

Computational Fluid Dynamics Engineer, Procegence, May 2022 – September 2022

Summer Intern, Sandia National Laboratory, July 2020 – August 2020

Academic Cooperation Participant, Lawrence Livermore National Laboratory, March 2015 – August 2015

Reliability Engineer Consultant, AMS Group, LTD (now Stork), October 2012 - May 2013

Project Engineer, Ingenieros Mecanicos Asociados – INMA, June 2012 – October 2012

Reliabilty Engineer, Mantenimiento Preventivo Correctivo - MPC Asociados, February 2011 – May 2012

Intern, ISAGE SA ESP, July 2010 – January 2011

Languages

Portuguese

Spanish

Publications

Arias-Ramirez Walter, Nikhil Oberoi, and Larsson Johan. A multi-fidelity approach to sensitivity estimation in large eddy simulation. AIAA Journal 2023 61:8, 3485-3495 https://doi.org/10.2514/1.J062875

Arias-Ramirez Walter and Larsson Johan. Grid sufficiency in large eddy simulations as a hypothesis test. Int. J. Computational Fluid Dynamics. 2022. https://doi.org/10.1080/10618562.2022.2088739

Oberoi N, Arias-Ramirez Walter, Larsson J. Multi-fidelity parametric sensitivity estimation for large eddy simulation with the Spalart–Allmaras model. https://doi.org/10.1080/14685248.2023.2212982

Ricciardi T., Arias-Ramirez Walter, Wolf W. On secondary tones arising in trailing-edge noise at moderate Reynolds numbers. European J. of Fluid Mechanics. 2020. https://doi.org/10.1016/j.euromechflu.2019.08.015

Arias-Ramirez Walter and Wolf William. Effects of trailing edge bluntness on airfoil tonal noise at low Reynolds numbers. J Braz. Soc. Mech. Sci. Eng. 38, 2369–2380 (2016) https://doi.org/10.1007/s40430-015-0308-6

Arias-Ramirez Walter and Olson Britton. Compressible Flow Simulations of Wave Scattering Problems Using Immersed Boundary Method. 22nd AIAA/CEAS Aeroacoustics Conference, 2016. https://doi.org/10.2514/6.2016-2781

Walter A. Ramirez and William Wolf. The Effects of Suction and Blowing on Tonal Noise Generation by Blunt Trailing Edges. 21st AIAA/CEAS Aeroacoustics Conference, 2015 https://arc.aiaa.org/doi/abs/10.2514/6.2015-2364

Presentations

Advanced Simulation and Computing, Principal Investigators Meeting, ASC-PI, Monterey, CA, 2022.

69th, 72nd, and 73rd Annual Meeting of the American Physical Society's Division of Fluid Dynamics (APS DFD).

21st and 22nd AIAA/CEAS Aeroacoustics Conference.

Project Experience

Conducted air dispersion modeling and evaluation of oxygen levels in confined spaces under different ventilation systems.

Conducted multi-physics modeling to characterize the thermal and fluid dynamic behavior of newly designed catheters.

Performed noise characterization and noise reduction analyses for a new air purifier prototype.