Manuel Ayala

Johns Hopkins University
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Education

2026 *(anticipated)* **Ph.D. Mechanical Engineering**, Johns Hopkins University, Baltimore, MD, USA
Research Areas: Interaction of atmospheric turbulence in offshore wind farms
Advisor: Dennice Gayme, Ph.D and Charles Meneveau, Ph.D

2023 *(anticipated)* **M.S. Mechanical Engineering**, Johns Hopkins University, Baltimore, MD, USA

2021 M.S. Aerospace Engineering, Old Dominion University, Norfolk, VA, USA
GPA: 4.0

2019 B.S. Mechanical Engineering, Universidad de Oriente, Barcelona, Anzoategui, Venezuela
GPA: 3.2

Research Experience

Turbulence Research Group | August 2021 - Present
Johns Hopkins University, Baltimore, MD, USA
Principal Investigator: Dennice Gayme, Ph.D and Charles Meneveau, Ph.D
Role: **Graduate Research Assistant**

- Working on the turbulence behavior of off-shore wind farms in an atmospheric boundary layer using LES (Large Eddy Simulation)

Fluids Research Group | August 2019 - September 2021
Old Dominion University, Norfolk, VA, USA
Principal Investigator: Robert Ash, Ph.D.
Role: **Graduate Research Assistant**

- Explored the non-equilibrium pressure effects on the spacing between aircraft trailing line vortex pairs

Systems Research Laboratory | August 2019 - September 2021
Old Dominion University, Norfolk, VA, USA
Supervisor: Oscar Gonzalez, Ph.D.
Role: **Graduate Research Assistant**

- Developed a fuzzy Logic model-less aircraft controller
- Implemented fuzzy controller on an aircraft model in the NASA Langley 12-Foot low speed tunnel

Teaching Experience

Teaching Assistant | August 2023 - Present
Johns Hopkins University, Baltimore, MD, USA
Department of Mechanical Engineering
Course (Level): **Thermodynamics (231)**

Adjunct Faculty | May 2023 - August 2023
Old Dominion University, Norfolk, VA, USA
Department of Engineering Technology
Course (Level): **Thermal Applications (350)**

Teaching Assistant | June 2023 - July 2023
Johns Hopkins University, Baltimore, MD, USA
Department of Physics
Course (Level): **General Physics Lab I (171)**

Teaching Assistant | January 2023 - June 2023
Johns Hopkins University, Baltimore, MD, USA
Department of Mechanical Engineering
Course (Level): **Fluids II (622)**

Teaching Assistant | August 2022 - December 2022
Johns Hopkins University, Baltimore, MD, USA
Department of Mechanical Engineering
Course (Level): **Intermediate Fluid Mechanics (427/527)**

Publications

1. **M. Ayala** and O. Gonzalez, "Fuzzy Logic Model-less 3-DOF Flight Controllers," Proceedings from IEEE Aerospace Conference (AERO), 2022.

2. O. Ayala, O. Humphries, T. Youells, T.J. Thomas, and **M.Ayala**, "Computational Fluid Dynamics to Study the Origin of Secondary Flows in Square Ducts With Straightened Elbow Concept Governed by Artificial Body Force," Proceedings of the ASME 2021 International Mechanical Engineering Congress and Exposition. Volume 10: Fluids Engineering. Virtual, Online. November 1–5, 2021. V010T10A027. ASME. https://doi.org/10.1115/IMECE2021-71675

3. **M. Ayala** and J.M. Cimbala, "Numerical approach for prediction of turbulent flow resistance coefficient of 90° pipe bends," Proceedings of the Institution of Mechanical Engineers, Part E: Journal of Process Mechanical Engineering, 2021;235(2):351-360. doi:10.1177/0954408920964008

4. **M. Ayala**, O.F. Ayala and O.M. Ayala, "Numerical study of the secondary flow formation of a fluid passing through a 90° elbow with square cross section," 4th Thermal and Fluids Engineering Conference, Las Vegas, NV, USA, April, 14–17, 2019. ASTFE. doi: 10.1615/TFEC2019.fnd.028007

5. **M. Ayala**, P. Santos, G. Hamester and O.M. Ayala, "Secondary Flow of Liquid-liquid Two-Phase Fluids in a Pipe Bend," Proceedings of the 2016 COMSOL Conference, Boston, MA, USA, October, 5–7, 2016.

Posters and Presentations

1. **M. Ayala**, D. Gayme and C. Meneveau, "Wall Modeling for Large Eddy Simulations of Wind-Wave Interactions", presented at the "200 years of Navier-Stokes and Turbulence" GFD Summer School, 31 July - 25 August 2023, Les Houches, France

2. **M. Ayala**, Z. Sadek, O. Fercak, R. Cal, D. Gayme and C. Meneveau, "Wall-modeled LES of wind-wave-wake dynamics affecting an offshore wind turbine," presented at 75th Annual Meeting of the APS Division of Fluid Dynamics, 20-22 November 2022, Indianapolis, IN, USA

3. **M. Ayala** and O. Gonzalez, "Fuzzy Logic Model-less 3-DOF Flight Controllers," presented at 2022 IEEE Aerospace Conference (AERO), 5-12 March 2022, Big Sky, Montana, USA

4. **M. Ayala** and R. Ash, "Analysis of a non-equilibrium vortex pair as aircraft trailing vortices," presented at 74th Annual Meeting of the APS Division of Fluid Dynamics, 21-23 November 2021, Phoenix, AZ, USA

5. **M. Ayala**, O.F. Ayala and O.M. Ayala, "Numerical study of the secondary flow formation of a fluid passing through a 90° elbow with square cross section," presented at 4th Thermal and Fluids Engineering Conference (ASTFE), 14–17 April 2019, Las Vegas, NV, USA

6. **M. Ayala**, P. Santos, G. Hamester and O.M. Ayala, "Secondary Flow of Liquid-liquid Two-Phase Fluids in a Pipe Bend," presented at the 2016 COMSOL Conference, 5-7 October 2016, Boston, MA, USA

Grants and Fellowships

2021 Percy Pierre Fellowship
Grantor: Whiting School of Engineering, Johns Hopkins University, Baltimore, MD, USA
Duration: 2 year

2020 Faculty Emeriti Association Klinefelter/Phillips Scholarship
Grantor: Faculty Emeriti Association. Old Dominion University
Duration: 1 year

Leadership and Mentorship

Secretary | JHU Mechanical Engineering Graduate Association (MEGA) 2022-2023

PhD Student Representative | JHU Mechanical Engineering DEI Comittee 2022-2023

Languages Spoken

English (Fluent), Spanish (Fluent)