

Carlos González Hernández

Department of Aeronautics & Astronautics
496 Lomita Mall, Stanford, CA 94305

cgonher@stanford.edu
cghernan.github.io
+1 650-441-4590

EDUCATION

Ph.D. in Mathematics	2021
Imperial College London, London, United Kingdom	
M.S. in Physics	2015
Ecole Polytechnique, Palaiseau, France	
B.S.+M.S. in Aerospace Engineering	2014
Universidad de Sevilla, Seville, Spain	

APPOINTMENTS

Stanford University	01/2023 – Present
Research Fellow, Department of Aeronautics & Astronautics	
Imperial College London	01/2023 – Present
Honorary Research Fellow, Department of Aeronautics	
Imperial College London	03/2020 – 12/2022
Research Associate, Department of Aeronautics	
Leeds Institute for Fluid Dynamics	03/2022 – 06/2022
Visiting Fellow, School of Mathematics	
Imperial College London	10/2016 – 02/2020
Research Assistant, Department of Mathematics	
French Atomic Energy Commission	01/2016 – 09/2016
Research Scientist, Inertial Confinement Fusion Team, CELIA/CEA	
French Aerospace Laboratory	03/2015 – 09/2015
Research Intern, Aerodynamics, Aeroelasticity and Acoustics, DAAA/ONERA	
Von Karman Institute for Fluid Dynamics	07/2011 – 09/2011
Research Intern, Department of Aeronautics and Aerospace	

RESEARCH AREAS

Machine learning and data science for modeling and control of complex systems: model reduction, sparse sensing, and feedback control of high-dimensional dynamical systems.

Scientific machine learning, PINN, data reduction, clustering, regression learning, reinforcement learning, compressed representations, optimization, foundation models, interpretable AI.

Petrov-Galerkin model order reduction, nonlinear manifold approximation, hyperreduction methods via artificial neural networks and Gaussian processes.

PUBLICATIONS

Journal Articles

- 2025 [8] Hernández, C. G., Tezaur, R. and Farhat, C. “Gaussian-process-augmented projection-based model order reduction for mitigating the Kolmogorov barrier to reducibility.”, In preparation.
- 2025 [7] Hernández, C. G. and Hwang, Y. “Wall turbulence without self-sustaining process.”, In preparation.
- 2024 [6] Hernández, C. G., Cao, K., Herrmann, B., Brunton, S. and McKeon, B. J. “Toward data-driven resolvent analysis of nonlinear flows.” *CTR Ann. Res. Briefs*. <https://ctr.stanford.edu/publications/annual-research-briefs/>
- 2023 [5] Luo, Z., Hernández, C. G. and Hwang, Y. “Generalized quasilinear approximations in homogeneous shear turbulence.” *Phys. Rev. Fluids* 8, 064604. doi:10.1103/PhysRevFluids.8.064604
- 2022 [4] Hernández, C. G., Yang, Q. and Hwang, Y. “Generalised quasilinear approximations of turbulent channel flow: Part 2. Spanwise triadic scale interactions”.” *J. Fluid Mech.* 944, A34. doi:10.1017/jfm.2022.499
- 2022 [3] Hernández, C. G., Yang, Q. and Hwang, Y. “Generalised quasilinear approximations of turbulent channel flow: Part 1. Streamwise nonlinear energy transfer.” *J. Fluid Mech.* 936, A33. doi:10.1017/jfm.2022.59
- 2020 [2] Hernández, C. G. and Hwang, Y. “Spectral energetics of a quasilinear approximation in uniform shear turbulence.” *J. Fluid Mech.* 904, A11. doi:10.1017/jfm.2020.678
- 2019 [1] Hernández, C. G. and Wu, X. “Receptivity of supersonic boundary layers over smooth and wavy surfaces to impinging slow acoustic waves.” *J. Fluid Mech.* 872, 849-888. doi:10.1017/jfm.2019.388

Conference Proceedings

- 2021 [1] Hernández, C. G. and Hwang, Y. “Spectral Energetics of a Quasilinear Approximation in Uniform Shear Turbulence.” *Turbulence IX. iTi 2021. Springer Proc. in Phys.* vol 267. doi:10.1007/978-3-030-80716-0_33

Thesis

- 2021 Hernández, C. G. “New Receptivity Mechanisms of Supersonic Boundary Layers.” Department of Mathematics, Imperial College London. Ph.D. Thesis.

CONFERENCE ACTIVITY AND TALKS

Conference Papers presented and Invited Talks

- 2024 NASA Advanced Modeling and Simulation Seminar series, NASA Ames (USA).
- 2024 77th APS Fluid Dynamics, Salt Lake City (USA).
- 2023 76th APS Fluid Dynamics, Washington DC (USA).
- 2023 Theoretical Division, Los Alamos National Laboratory (USA).
- 2023 76th APS Fluid Dynamics, Washington DC (USA).

- 2023 TFSA Conference, Stanford (USA).
- 2022 75rd APS Fluid Dynamics, Indianapolis, Indiana (USA).
- 2022 Causality in Turbulence and Transition, Madrid (Spain).
- 2021 74th APS Fluid Dynamics, Phoenix, Arizona (USA).
- 2021 ICTAM 2020+1, Milano (Italy).
- 2021 iTi – interdisciplinary Turbulence initiative, Darmstadt (Germany).
- 2020 73rd APS Fluid Dynamics, Chicago, Illinois (USA).
- 2018 71st APS Fluid Dynamics, Atlanta, Georgia (USA).
- 2018 12th European Fluid Mechanics Conference, Vienna (Austria).
- 2018 UK Fluids Conference 2018, Manchester (UK).
- 2018 18th USNC Theoretical and Applied Mechanics, Chicago, Illinois (USA).
- 2017 EUROMECH 591, Bari (Italy).

GRANTS AND AWARDS

Awards and Fellowships

- 2022 CTR Fellowship (\$74,000). Center for Turbulence Research, Stanford University (USA).
- 2022 Visiting Fellowship (£3,000). Leeds Institute for Fluid Dynamics, University of Leeds (UK).
- 2018 Travel Grant (\$1,000). APS Fluid Dynamics (Atlanta, Georgia, USA).
- 2016–20 Roth Doctoral Fellowship (£100,000). Department of Mathematics, Imperial College London. Awarded to the most promising candidate for a Ph.D. in Mathematics (3.5-year funding).
- 2016 Ph.D. Fellowship (€70,000, declined). LadHyx, Ecole Polytechnique. Awarded through the Ecole Doctorale of Ecole Polytechnique (3-year funding).
- 2014 Fee waiver for M.S. in Fluid Mechanics at Ecole Polytechnique (€4,000). French Ministry of Defence (DGA).
- 2008 Fee waiver for first year of university studies (€2,000). Baccalaureate Special Distinction: 9.94/10.00. Andalusian Government.

STUDENT SUPERVISION

- 2023 Katherine Cao, Center for Turbulence Research (co-supervised with B. McKeon, Stanford University) ‘ResDMD for turbulent flows’. M.S. Project.
- 2020–24 Zhenghao Luo, Department of Aeronautics (co-supervised with Y. Hwang, Imperial College) ‘Generalized quasi-linear approximation in uniform shear turbulence’. Ph.D. Thesis.
- 2020 Jonathan de Sousa, Department of Aeronautics (co-supervised with Y. Hwang, Imperial College) ‘Non-modal analysis of tilted stratified shear flows’. UROP.
- 2018 Ziheng Yu, Department of Aeronautics (co-supervised with Y. Hwang, Imperial College) ‘Minimal quasi-linear approximation in uniform shear turbulence’. M.S. Thesis.

COURSES TAUGHT

Stanford University

2023 Low-Order Modeling for Turbulent Flows

Imperial College London

2017–21 Complex Analysis

2017–21 Infinitesimal Calculus

2021 Reinforcement Learning

MEMBERSHIPS

2018– Isaac Newton Institute for Mathematical Sciences, University of Cambridge

2018– American Physical Society

CODING

Languages: FORTRAN, C/C++, MATLAB, Mathematica, Python (PyTorch).

LANGUAGES

Spanish (Mother tongue), French (Fluent), English (Fluent), Italian (Fluent).