

Alexandre Cortiella

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Authorized to work in the United States.

SUMMARY

Curious aerospace engineer passionate about science and technology. I aspire to become an expert and make useful contributions to the aerospace sector. I am experienced in computational mechanics, data-driven modeling and machine learning.

EDUCATION

Ph.D. Aerospace Engineering

University of Colorado Boulder, Boulder, CO

Ph.D. Thesis: Data-driven model development and identification of dynamical systems.

Spring 2021

M.S. Aerospace Engineering

University of Colorado Boulder, Boulder, CO

Spring 2018

B.S. Aerospace Engineering

Technical University of Catalonia, Barcelona, Spain

B.S. Thesis: Study of numerical techniques for structural optimization in aeronautics.

Spring 2014

EXPERIENCE

Postdoctoral Associate, PSAAP-III Center at Stanford

Boulder, CO / Stanford, CA

March 2022 - Present

- Currently doing research on data-driven modeling and uncertainty quantification of exascale Multiphysics simulation ensembles.
- Researcher in the Predictive Science Academic Alliance Program at Stanford University working on the Integrated Simulations using Exascale Multiphysics Ensembles (INSIEME project).

Research Associate, Aerospace Mechanics Research Center

Boulder, CO

January 2017 – March 2022

- Developed dual state and parameter estimation algorithms based on Bayesian Inference methods.
- Devised novel algorithms for data-driven dynamical model identification from noisy data using sparse regularization and machine learning techniques.
- Developed partitioned finite element thermal-structure and fluid-structure interaction algorithms.
- Presented research at various workshops and conferences including SIAM Computational Science and Engineering 2021.
- Served as a teaching assistant for Structures and Materials course, mentored students, and prepared lectures.

Research Scientist, Laboratory for Atmospheric and Space Physics

Boulder, CO

June 2018 - August 2018

- Analyzed data from Juno spacecraft to identify plasma and radiation particles of Jupiter's radiation belts.
- Performed Monte Carlo simulations and sensitivity analyses using ESA's Multi-Layered Shielding Simulation Software.
- Developed mathematical models for Jupiter radiation high-energy particle environment.
- Collaborated with and reported results to NASA Jet Propulsion Laboratory.

GNC Engineer, UPC Nanosat Lab

Barcelona, Spain

May 2015 - August 2016

- Designed and implemented attitude determination and control algorithms for a Earth Observation nanosatellite.
- Programmed a spacecraft flight dynamics simulator for Low Earth Orbit nanosatellite missions.
- Planned, executed, evaluated, and supervised all phases of spacecraft flight dynamics, estimation, and control operations.
- Collaborated and scheduled critical review meetings with industry partners from Elecnor Deimos.

SKILLS

Communication

- Languages: Spanish (Native), Catalan (Native), English (Professional), French (Basic).
- Presented my research at conferences and published articles in prestigious journals.
- Mentored and taught undergraduate and graduate engineering students.

Leadership

- President of the CU Catalan Club - Managed and organized events to promote Catalan culture.
- Founding member of CU Graduate Colloquium Seminars - Organized and coordinated talks and workshops.
- Captain of a Federated Handball team – Handball player for 17 years in three different teams.

Technical

- MATLAB & Simulink, Python, C++, HTML-CSS.
- Solid Works, CATIA, ANSYS, TensorFlow, PyTorch.
- System identification, Machine learning, State Estimation, Numerical simulation, Spacecraft dynamics, GNC.

HONORS AND AWARDS

- Awarded a SIAM Student Travel Award CSE 2021 Conference (2021).
- Awarded a Graduate International Travel Grant by University of Colorado (2019).
- Awarded a Conference Travel Grant by University of Washington (2019).
- Ph.D. research funded by National Science Foundation (NSF) Grant: CMMI-1454601 (2018).
- Winner of the Space Station Design Challenge at the Institute of Space Systems, Germany (2016).
- Recipient of a Balsells Fellowship for graduate studies at University of Colorado Boulder (2016).
- Recipient of a Research Fellowship by Institut d'Estudis Espacials de Catalunya (IEEC) (2015).
- Distinguished B.S. Thesis Award for being among the top 5% (2014).

PUBLICATIONS

- Cortiella, A.; Park, K.C.; Doostan, A. "Sparse Identification of Nonlinear Dynamical Systems via Reweighted ℓ_1 -regularized Least Squares". *Computer Methods in Applied Mechanics and Engineering*. vol. 376. 2021.
- Cortiella, A.; Vidal, D.; Jané, J.; Juan, E.; Olivé, R.; Amézaga, A.; Munoz, J.F.; Via, P.; Carreno-Luengo, H.; Camps, A. "3Cat-2 - Attitude Determination and Control System for a GNSS-R Earth Observation 6U CubeSat Mission". *European Journal Of Remote Sensing* Vol. 49, Iss. 1, 2016.
- Carreno-Luengo, H.; Camps, A.; Via, P.; Munoz, J.F.; Cortiella, A.; Vidal, D.; Jané, J.; Catarino, N.; Hagenfeldt, M.; Palomo, P.; Cornara, S. "3Cat-2—An Experimental Nanosatellite for GNSS-R Earth Observation: Mission Concept and Analysis", in *IEEE Journal of Selected Topics in Applied Earth Observations and Remote Sensing*, vol. 9, no. 10, pp. 4540-4551, 2016.

PAPERS IN PREPARATION

- Cortiella, A.; Park, K.C.; Doostan, A. "A Priori Denoising Strategies for Sparse Identification of Nonlinear Dynamical Systems: A Comparative Study". Preprint submitted to *ASME Journal of Computing and Information Science in Engineering*.
- C.O. Ahn, A. Cortiella, J.G. Kim, K.C. Park. "Partitioned Symmetric Formulation and Solution Algorithms of Thermoelastic Interaction Problems". Preprint submitted to *Computer Methods in Applied Mechanics and Engineering*.
- Cortiella, A.; Doostan, A. "Sparse Identification of Nonlinear Dynamical Systems via Gradient-Based, Non-Convex Optimization" to be submitted to *Computer Methods in Applied Mechanics and Engineering*.

CONFERENCES

- Engineering Mechanics Institute Conference/Probabilistic Mechanics and Reliability 2021 Conference. May 25 – May 28, 2021, (Virtual Conference). Presentation: Sparse Identification of Nonlinear Dynamical Systems via Reweighted ℓ_1 -regularized Least Squares.
- SIAM Computational Science and Engineering 2021. Mar 1 – Mar 5 1, 2021, (Virtual Conference). Presentation: Denoising Methods for Data-Driven Recovery of Nonlinear Dynamical Systems.
- Applied Mathematics: The Next 50 Years - Workshop and Conference. Jun 17 – Jun 21, 2019. University of Washington, Seattle, WA, U.S.A.
- 8th International Conference on Computational Methods for Coupled Problems in Science and Engineering (COUPLED PROBLEMS 2019). Jun 3 – Jun 5, 2019, Sitges, Catalonia, Spain.
- Multi-Physics Workshop: Advances in Numerical Methods for Simulation, Optimization, and Uncertainty Quantification of Coupled Physics Problems. Apr 23 – Apr 24, 2018, University of Colorado Boulder, Boulder, CO, U.S.A.
- 2015 IEEE Young Professionals in Remote Sensing Conference. Dec 2 – Dec 5, 2015, Barcelona, Catalonia, Spain. Presentation: Attitude Determination and Control System for a GNSS-R Earth Observation 6U CubeSat Mission.