Alexandre Cortiella

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Seeking an internship in system identification, machine learning and data science.

- EDUCATION -

University of Colorado Boulder Boulder, CO, United States 2016 – 2021
Ph.D. degree in Aerospace Engineering (Structures and Materials thrust)
Advisors: Professors Alireza Doostan and Kwang-Chun Park.

- Currently working on identification of nonlinear mechanical systems using sparse regularization methods, machine learning and artificial neural networks. My research focuses on identifying and understanding a physical model from noisy measurements and predicting its behavior.
- Mentored students for the Statics, Structures and Materials course.

Technical University of Catalonia (BarcelonaTech) Terrassa, Spain 2010 – 2014
B.S. degree in Aerospace Engineering | 4-year degree

B.S. Thesis (2014) – Study of numerical techniques for structural optimization in aeronautics.

- Analyzed finite element and nonlinear optimization techniques applied to structural topology optimization of aerospace structures.
- Developed a software tool for structural topology optimization based on density methods.
- Optimized the topology of an aircraft wing rib structure subject to weight constraints and aerodynamic loads.

- WORK EXPERIENCE -

Aerospace Mechanics Research Center Boulder, CO, United States January 2017 – Present
Graduate research assistant

- Analyzed the performance and accuracy of algorithms for non-matching interfaces: global and localized Lagrange multipliers, Mortar-like methods and projection techniques.
- Investigated the performance of mixed finite element formulations for acoustic fluid-structure interaction and liquid sloshing.
- Implemented staggered fluid-structure interaction algorithms with moving meshes.
- Developed novel numerical techniques for dynamic coupling of elastic structures under thermal loads.
- Developed a novel algorithm for system identification from noisy data using sparse regularization techniques.

Laboratory for Atmospheric and Space Physics (LASP) June 2018 – August 2018
Graduate research assistant

- Analyzed data from Juno spacecraft to identify plasma and radiation particles of Jupiter's radiation belts.
- Performed Monte Carlo simulations using ESA's Multi-Layered Shielding Simulation Software (MULASSIS).
- Developed software to model Jupiter radiation environment.

UPC Nanosat Lab Barcelona, Spain May 2015 – August 2016
GNC Researcher
Director: Professor Adriano Camps.

- Developed and designed control and determination algorithms of a 6U Cubesat whose aim is to test a new dual frequency GNSS-R altimeter for an Earth Observation mission.
- Analyzed, simulated and validated tests of attitude determination and control systems (ADCS) for nanosatellites focused on magnetic actuation and reaction wheels. Performed Monte Carlo and sensitivity analyses.
- Programmed a spacecraft attitude dynamics and control simulator for nanosatellites focused on Low Earth Orbit missions.

- SKILLS -

LANGUAGES

MOTHER TONGUE **Catalan, Spanish**

OTHER LANGUAGES

	English	**French**
• Reading skills	Advanced (CEFR-C1)	Intermediate
• Writing skills	Advanced (CEFR-C1)	Basic
• Conversational:	Advanced (CEFR-C1)	Basic

COMPUTER

Operative systems: Windows / Linux

Office: MS Word / MS Excel / MS Power Point / Latex 2.0
Programming: C++ / MATLAB & Simulink / Fortran 90 / Python
Engineering: Solid Works **/** CATIA V5**/** AutoCad **/** ANSYS / Nastran

- HONORS AND AWARDS -

- 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).
- Member of the winning team of the Space Station Design Workshop. (2016)
- Awarded a Balsells Fellowship for graduate studies at University of Colorado Boulder. (2016)
- Awarded a research fellowship by Institut d'Estudis Espacials de Catalunya (IEEC). (2015)
- Distinguished B.S. Thesis Award for being among the top 5%. (2014)

- EXTRACURRICULAR ACTIVITIES -

- FSM Grad Colloquium Committee member – Seminar series aiming to host graduate student speakers who will give brief research fundamentals talks to promote interaction and facilitate knowledge exchange and potential collaborations. (September 2019 - Present)
- President of the CU Catalan Club at University of Colorado Boulder. (September 2016 – Present)
- Polar Cube Project at Space Grant Consortium Colorado – Simulated attitude control algorithms for a 3U cubesat with reaction wheels. (Fall 2016 – Spring 2017)
- Space Station Design Workshop 2016 (Stuttgart, Germany) – Intensive one-week team competition focused on designing a conceptual Space Station located in cis-lunar space. Responsible for the Attitude and Orbit Control System. (2016)
- Online MOOC courses via EDx: "Hypersonics – from shock waves to scramjets" (University of Queensland) **|** "Introduction to programming with Java" (Universidad Carlos III). (2015)

- Course in Computational Fluid Dynamics by the Heat and Mass Transfer Technological Center: laminar flow and introduction to turbulence modelling (BarcelonaTech). (2014)
- L3S Cubesat Launcher Project at UPC – Developed a launch vehicle capable of putting cubesat nanosatellites into Low Earth Orbits. Designed the nose cone structure of the rocket, and performed vibration analysis using a finite element software. (2013)
- Course in C++ programming by the Heat and Mass Transfer Technological Center. (2013)
- RockLab Project at Terrassa Rocket Team – Designed the propulsion system of a small solid rocket aimed at operating at 28 km above sea level. (January 2011 – June 2013).
- Handball player – Played in four different handball teams including F.C.Barcelona and Catalonia Team (team formed by the best players in Catalonia region). Captain of two teams. Won three National Spanish Championships. (1999 – 2015)

- PUBLICATIONS -

- 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, Oct. 2016.

- Cortiella, A.; Park, K.C.; Doostan, A. "Sparse Identification of Nonlinear Dynamical Systems via Reweighted ℓ1-regularized Least Squares". Submitted to Computer Methods in Applied Mechanics and Engineering on May 2020. https://arxiv.org/abs/2005.13232.

- CONFERENCES -

- 2015 IEEE Young Professionals in Remote Sensing Conference. December 2 – December 5, 2015, Barcelona, Catalonia, Spain. Presentation: *Attitude Determination and Control System for a GNSS-R Earth Observation 6U CubeSat Mission*.

- Multi-Physics Workshop: Advances in Numerical Methods for Simulation, Optimization, and Uncertainty Quantification of Coupled Physics Problems. April 23 – April 24, 2018, University of Colorado Boulder, Boulder, CO, U.S.A.

- 8TH International Conference on Computational Methods for Coupled Problems in Science and Engineering (COUPLED PROBLEMS 2019). June 3 – June 5, 2019, Sitges, Catalonia, Spain. Presentation: *Partitioned Symmetric Formulation and Solution Algorithms of Thermoelastic Interaction Problems.* Article to be submitted.

- 15th U.S. National Congress on Computational Mechanics. July 28 – August 1, 2019, Austin, Texas, USA. Presentation: *Improving Stability of Numerical Methods for Recovering Governing Equations from Noisy Data.* Article to be submitted.