CURRICULUM VITAE

Dr. Maria D. Cortes
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SUMMARY OF EXPERTISE

Dr. Maria D. Cortes experience comprises the implementation of advanced testing methodologies, i.e., earthquake simulators (by means of shake tables) and quasi-static distributed hybrid simulation for the analysis and simulation of structures under dynamic loading. M. Cortes is an Associate Professor at the University of Puerto Rico at Mayaguez, at the Department of Engineering Sciences and Materials where she teaches freshman undergraduate engineering courses. M. Cortes has also remained active on research and was awarded in 2015 a Faculty Development Award by Department of Defense Nuclear Regulatory Commission to develop hybrid simulation facilities at the University of Puerto Rico at Mayaguez. On February 2019, M. Cortes was awarded the Puerto Rico NASA EPSCoR Seed grant to establish research collaborations with NASA Langley and NASA Glenn Research Center. Moreover, Cortes has been granted the NASA Summer Faculty Fellowship to work at the Structural Dynamics and Integration Systems Division at NASA Marshall Space Flight Center for the Summer of 2019 and to work on the Structural Dynamics Division NASA Glenn Research Center for the Summer of 2020. More recently, M. Cortes was awarded the 2020 IEEE Power Engineering Society Outstanding Chapter Volunteer Award for the outstanding collaborations and new educational initiatives related to energy systems in the IEEE Western Puerto Rico Section. Her current research projects focus on the Validation of Integrated Large Complex Structural Systems focusing on Large Space Structures and Combined Structural Renewable Energy Systems with a combination of advanced testing methodologies with the utilization of Cyber-Physical System sensing approaches.

EDUCATIONAL/PROFESSIONAL BACKGROUND

1999	B.S.	Civil Engineering (Magna Cum Laude), University of Puerto Rico, Mayagüez, PR
2005	M.S.	Civil Engineering (Structural Engineering) GPA: 4.0, University of Puerto Rico, Mayagüez, PR
2014	Ph.D.	Civil Engineering (Structural & Earthquake Engineering), University at Buffalo (SUNY), NY, US

RESEARCH AND PROFESSIONAL EXPERIENCE

February 2020 — **NASA Summer Faculty Fellowship Winner NASA Glenn Research Center (2020)**

The outcome of the summer was to demonstrate the applicability of hybrid simulation and identify any limitations with the approach as well as further

the research in the fixed base correction methods. Ideally a process/procedure would be written on how to implement hybrid simulations during a spaceflight hardware vibration qualification test. The benefit to NASA of this collaboration during the planned Faculty Fellow program, was that the Structural Dynamics Branch is interested in applying hybrid simulation to help calibrate/correlate non-linear hardware and/or non-linear joints in finite element models.

July 2019-Present

Associate Professor of the Department of Engineering Sciences and Materials

Received tenure and a promotion to Associate Professor. Created the Experimental Dynamic Simulation Research Aerospace-Energy (ExDSRAE). This research site can be accessed through www.exdsrae.com. ExDSRAE is focused on the applications of current methods to aerospace structures and renewable energy complex systems.

June 2019- Sep 2019

NASA Summer Faculty Fellow at NASA Marshall Space Flight Center

Worked at the Structural Dynamics and Integration Systems Division at NASA Marshall Space Flight Center. Her research project involved the application of an innovative approach for the calibration of Finite Element models (FEMs) and testing of large space structures. The deliverables of the Summer Fellowship were published on the Final Report included on a NASA MSFC Report.

Sep 2016- July 2019

Assistant Professor of the Department of Engineering Sciences and Materials (Tenure track)

Created the Experimental Dynamic Simulation Research (ExDSR) and ExDSRA. Our research focuses on two of the experimental methods used to test structures under dynamic loads: shaking table and hybrid simulation. This research can be accessed through: www.uprm.edu/exdsr. ExDSRA is focused on the applications of current methods to aerospace structures and systems. This project was funded by the United States Nuclear Regulatory Commission (NRC). Grant No: NRC-HQ-84-15-G-0032. The University of Puerto Rico at Mayaguez Faculty Development Program: Structural Engineering for Nuclear Facilities – Experimental Research Initiative.

August 2014- June 2016

Assistant Professor of the Department of Engineering Science and Materials (Contract Full-Time Professor)

Taught undergraduate courses (INGE3011, INGE3012 and INGE3809) and proposal writing.

RELEVANT PUBLICATIONS

Journals and proceedings:

1. Kijewski-Correa, T., **Cortes Delgado, M. D**., Gutierrez Soto, M., Javadinasab Hormozabad, S., & Roueche, D. (2020, November). *EVENT BRIEFING - Hurricane Eta* (PRJ-2954). Structural Extreme Events Reconnaissance (StEER) Network. https://doi.org/10.17603/ds2-jdgs-1667
2. Kijewski-Correa, T., **Cortes Delgado, M. D**., Crawford, S., Javadinasab Hormozabad, S., & Strader, S. (2020, October). *EVENT BRIEFING -Hurricane Delta - Lousiana-New Mexico* (PRJ-2933). Structural Extreme Events Reconnaissance (StEER) Network. https://doi.org/10.17603/ds2-y2gc-xj10
3. Acosta, A, Aponte, L., Archbold, J., **Cortes, M**, et. al.,. (2020, January). *StEER - 7 JAN. 2020 PUERTO RICO Mw 6.4 EARTHQUAKE: PRELIMINARY VIRTUAL RECONNAISSANCE REPORT (PVRR)* (PRJ-2670). Structural Extreme Events Reconnaissance (StEER) Network.
4. Prevatt, D. O., Roueche, D. B., R., Aponte-Bermúdez, L. D., Kijewski-Correa, T., Li, Y., **Cortes, M**., López Del Puerto, C., Mercado, A., Muñoz, J., Morales, A., & Chardon, P. (2018, November). Performance of Structures under Successive Hurricanes: Observations from Puerto Rico and the U.S. Virgin Islands after Hurricane Maria. *Forging Forensic Frontiers*, 1049–1059. https://doi.org/10.1061/9780784482018.101
5. **Cortes-Delgado, M.** and Gonzalez-Hernandez, L. (2018), "Development of the UPRM Hybrid Simulation Facilities: Substructuring Techniques Coupled Numerical Simulations." *International Conference on Experimental Vibration Analysis for Civil Engineering Structures, July 2017.*
6. Wang, T., Mosqueda, G., Jacobsen, A. and **Cortes-Delgado, M**. (2012), Performance evaluation of a distributed hybrid test framework to reproduce the collapse behavior of a structure. Earthquake Engng Struct. Dyn., 41: 295-313. https://doi.org/10.1002/eqe.1130
7. Mosqueda, G., **Cortes-Delgado, M**. and Wang, T. (2010), "Substructuring techniques for hybrid simulation of complex structural systems." *9th US National and 10th Canadian Conference on Earthquake Engineering*, July 2010.
8. Wang, T., Jacobsen, A., **Cortes-Delgado, M**., and Mosqueda, G. (2010), "Distributed online hybrid tests of a four-story steel moment frame using flexible test scheme." *9th US National and 10th Canadian Conference on Earthquake Engineering*, July 2010.

Other Significant Publications

1. **Cortes-Delgado, M.** (2014), Hybrid Simulation with Distributed Substructures Including Overlapping Domains, *Ph.D. Dissertation*, Department of Civil, Structural and Environmental Engineering, UB, February 2014.
2. **Cortes-Delgado, M**. (2005). Development of the UPRM Earthquake Simulator Facility for Dynamic Model Analysis. *M.S. Thesis,* Department of Civil and Environmental Engineering, UPRM. June 2005.

AWARDS AND HONORS

1. **2020 IEEE Power Engineering Society Outstanding Chapter Volunteer Award**
2. **GEM in STEM, Structural Engineer, 2019**
3. **NSF Travel Award for MECHS Hybrid Conference, 2021**
4. 2009-2012 – **NSF-Graduate Research Diversity Supplement** for doctoral engineering students

5. 2008-2012 - **Schomburg Fellowship -** offered by New York State for students with outstanding academic credentials and who are also historically underrepresented students in graduate programs across the university
6. 2008-2011 **– NSF- AGEP Fellowship**

EXTERNAL FUNDING FOR RESEARCH/EDUCATION:

(1) "The University of Puerto Rico at Mayaguez Faculty Development Program in Structural Engineering for Nuclear Facilities: Experimental Research Initiative", Nuclear Regulatory Commission, 2015, **$359,717.**

(2) "A Proposal to Establish Research Collaborations with NASA LANGLEY, NASA GLENN Research Centers and TEXAS A&M Department of Aerospace Engineering - A look into Substructuring Techniques and Real Time Hybrid Simulation for Aerospace Structures- Astronautics", PR NASA EPSCoR Seed Funds, 2019, **$19,650.00.**

(3) Hewlett Packard, Inc Puerto Rico donations for Course Project for 2021, **$2,000**.

STUDENT MENTORING

- **MS Thesis Advisor: Lemuel Gonzalez Hernandez,** Department of Civil Engineering and Surveying, University of Puerto Rico – Mayaguez, Completed Master's Degree on Summer 2019.

  Lemuel Gonzalez Hernandez, "*Development of UPRM hybrid simulation facilities for dynamic analysis*" MS Thesis Civil Engineering (Structural) (Spring 2019).

- **PhD Advisor: PhD Candidate Samuel Montalvo,** Department of Mechanical Engineering, University of Puerto Rico – Mayaguez, 3rd year of 5yr program.

  Proposal Defense:
  A METHODOLOGY FOR THE VALIDATION OF LARGE COMPLEX SPACE STRUCTURES BASED ON THE BUILDING BLOCK APPROACH AND HYBRID SIMULATION
  Evaluation: May 5, 2022

  AWARDS: S. Montalvo
  1. PR Space Grant NASA Fellowship 2020-2021
  2. PR Space Grant NASA Fellowship 2021-2022
  3. SLOAN Summer Fellowship -Summer 2021

- **Mentor Undergraduate Research Assistant Kelvin Filippetti,** B.S. Department of Civil Engineering and Surveying, 5th year. Research Assistant for Samuel Montalvo project.

  AWARDS: Kelvin Filippetti
  1. PR Space Grant NASA Fellowship 2020-2021
  2. PR Space Grant NASA Fellowship 2021-2022

- **Undergraduate Research Participation:**

1. Christian Flores Carreras, Undergraduate Research, Civil Engineering, UPRM.
2. Andres Matos, Undergraduate Research, BS Civil Engineering, UPRM.
3. Richard Rodriguez, Undergraduate Research, BS Mechanical Engineering, UPRM.
4. Jonathan Badillo, Undergraduate Research, BS Mechanical Engineering, UPRM.
5. Sebastian Rivera Mongil, Undergraduate Research, BS Mechanical Engineering, UPRM.
6. Samuel Montalvo Perez, Undergraduate Research, *BS* Civil Engineering, UPRM.
7. Steven Aviles Rivera, Undergraduate Research BS Civil Engineering, UPRM.
8. Elmer Irizarry Rosario, Undergraduate Research BS Civil Engineering, UPRM.
9. Ana Pineda Velez, Undergraduate Research, BS Civil Engineering, UPRM.
10. Austin Vega Pagan, Undergraduate Research, BS Civil Engineering, UPRM.
11. Camila Pena, Undergraduate Research, BS Mechanical Engineering, UPRM.
12. Kelvin Filippetti, Undergraduate Research, BS Civil Engineering, UPRM.
13. Eduardo Ferrer, Undergraduate Research, BS Mechanical Engineering, UPRM.
14. Aldo Morales, Undergraduate Research, BS Mechanical Engineering, UPRM.
15. Ian Diaz, Undergraduate Research, BS Mechanical Engineering, UPRM.
16. Gabriela Colon, Undergraduate Research, BS Mechanical Engineering, UPRM.
17. Joseph Gonzalez, Undergraduate Research, BS Civil Engineering, UPRM
18. Alondra Rodriguez, Undergraduate Research, BS Mechanical Engineering, UPRM.
19. Liza Rodriguez, Undergraduate Research, BS Chemical Engineering, UPRM.
20. Nathalia Ramos, Undergraduate Research, BS Industrial Engineering, UPRM.
21. Daniel Sierra, Undergraduate Research, BS Mechanical Engineering, UPRM.

SYNERGISTICS ACTIVITIES

1. **BEST of BEST SUMMER 2021**

   The Best Designs for Renewable Energy Concept for Puerto Rico of the whole Fall2020-Spring2021 academic year at COLEGIO (University of Puerto Rico at Mayaguez). They are all freshman undergraduate engineering students, and the course is about innovation, critical thinking and how to convey your ideas with CAD and engineering drawings. The groups worked all summer with 3D printing, implementing an Arduino setup to a mechanism and preparing a "pitch" video submission for the final Best of Best 2021.

   Link: BEST of BEST S2021 (exdsrae.com)

2. **PNNL/UPRM Seminar: Environmental Effects of Marine Renewable Energy** in Support of INGE3011 & INGE3809 Course Project Spring 2021

   Speakers:

   - Dr. Lysel Garavelli, Research Scientist Marine Energy and Hydropower, Pacific Northwest National Laboratory (PNNL)
   - Ms. Mikaela Freeman, M.S., Marine Science and Policy, Pacific Northwest National Laboratory (PNNL)

   Deliverables: Shared on OES Tethys website.

   Link: https://youtu.be/1v59MRGxz8M

3. **SANDIA/NREL/UPRM Seminar: Marine Energy Current Status and Future Practices** in Support
   Speakers:
   - Eng. Kelley Ruehl, M.S., WEC-SIM Division at Sandia Laboratories
   - Dr. Tom Nathan from National Renewable Energy Laboratory (NREL)
   - Dr. Yu Yi-Hsiang, National Renewable Energy Laboratory (NREL)

4. **First HP/UPRM Seminar: Industry 4.0** in Support of INGE3011 & INGE3809 Course Project Fall 2020 & Spring 2021
   Speaker:
   - Eng. Anel Sandoval, Business Strategy & Operations, Graphics Supply Operations, from HP, Inc. Puerto Rico.

5. **Second HP/UPRM Seminar: How tolerances are managed at HP** in Support of INGE3011 & INGE3809 Course Project Fall 2020 & Spring 2021
   Speaker:
   - Eng. Segi Gonzalez, Mechanical Engineer, 35 yrs. experience with tolerances from HP, Inc. Puerto Rico.

6. **Dr. Daniel Wendichansky Dynamics Experiential Module,** UPRM
   November 17, 2018

   In collaboration with the UPRM-Department of Engineering Science and Materials and Department of Civil Engineering and Surveying, led in the development of the dynamics experiential module named after her MS Thesis Advisor Dr. Daniel Wendichansky. The experiential module objective is to give undergraduate and graduate students the opportunity to learn about dynamics basics through their own experience. Furthermore, the module also targets and is developed to serve the Puerto Rican community. For more information visit: www.uprm.edu/exdsr

7. **1st Department of Engineering Science and Materials Open House,** UPRM
   March 30, 2017

   In collaboration with the UPRM-Department of Engineering Science and Materials, led in the development of the Open House activity. The Open House objectives were to give undergraduate and graduate students the opportunity to present their research in a technical poster competition and high school an overview of the Department areas and research (laboratories).

8. **A novel Education Module**, UB-NEES Site
   Summer 2013

   In collaboration with the UB-NEES site, led in the development and application of a novel Education module geared towards high-school students that demonstrated the effects of seismic activity (a simulated earthquake) on subscale 3-story structures with and without damping. This new EOT module was judged as a best practice across the entire U.S. NEES consortium of universities by the National Science Foundation's CMMI Director of NEES.

CONFERENCES

1. **WIE IEEE Women in STEM -UPRM, Spring 2021:** Speaker about experiences as a Woman Faculty in STEM field.
2. **2018 Worldwide Aerospace Users Group**, September 10-14, 2018: MTS Systems, Minneapolis, Minnesota, US,
3. **Sandia National Laboratory Visit-UPRM collaboration**, May 21-25, 2018: Sandia National Laboratory, New Mexico, US,
4. **Hybrid Simulation Technologies & Methods for Civil Engineering**, March 20-21, 2018: Pacific Earthquake Engineering Research Center (PEER) in Richmond, University of California at Berkeley, California, US.
5. **National Science Foundation-Natural Hazards Engineering Research Institute (NSF-NHERI)**, August 2017: University of Texas at San Antonio, to discuss possible research collaborations at NHERI facilities and NSF Career Proposals.
6. **7th International Conference on Experimental Vibration Analysis for Civil Engineering Structures**, EVACES2017, University of California at San Diego, July 2017.

SERVICE

1. Virtual STEM mentoring - Great Minds in STEM for the Summer of 2020
2. Virtual 5k for PR Pediatric Cancer 2020
3. Reviewer for Structures Journal
4. Member, Committee to Develop Graduate Program, Department of Engineering Science and Materials, 2015-2017.
5. Member, Committee Graphics Design and Applied Mechanics, 2015-2018.
6. Rehabilitation and updating of Structures Laboratory (Hydraulics and Infrastructure), Department of Civil Engineering and Surveying, 2015-2018.