

A. Castellanos

████████████████████
████████████████████ castellanosa@utep.edu

EDUCATION

- The University of Wisconsin-Madison** **Madison, WI**
Ph.D. in Civil and Environmental Engineering May 2019
Dissertation: Low Temperature Effects on Sandwich Composites under Low-Velocity Impact
GPA: 3.76/4.0
- The University of Texas at El Paso (UTEP)** **El Paso, TX**
Master of Science in Mechanical Engineering May 2016
Thesis: Through-Thickness Reinforcement for Woven Laminates
GPA: 4.0/4.0
- The University of Texas at El Paso (UTEP)** **El Paso, TX**
Bachelor of Science in Mechanical Engineering May 2014
GPA: 3.88/4.0 (Magna cum Laude)

RESEARCH EXPERIENCE

The University of Texas at El Paso **El Paso, TX**
Assistant Professor July 2019-Present

Current Projects:

Composites for high-temperature applications

- Thermal cycling analysis of composites for high-temperature applications is currently investigated experimentally and computationally.
- Computational modeling is being pursued to investigate the degradation of environmental barrier coating caused by silicate deposit.

Temperature and Environmental degradation of composites

- Seawater and temperature degradation effects of sandwich composites with metastable core subjected to impact and static loading are currently being investigated.

University of Wisconsin-Madison **Madison, WI**
Graduate Research Assistant Aug 2017-May 2019

Faculty Supervisor: Pavana Prabhakar, Ph.D.

- Developed a **macro-mechanical model in ABAQUS** that can predict damage by failure mechanisms such as delamination, matrix cracking, fiber-matrix debonding and fiber fracture during a low-velocity impact event in **woven carbon composites**.
- Investigated the **degradation** of the **mechanical properties** of **sandwich composites** subjected at **room** and **arctic temperatures**.

Indiana Manufacturing Institute (IACMI) **West Lafayette, IN**
Purdue University June 2017-Aug 2017

ORISE Graduate Intern

- Evaluated the stiffness of reinforced panels with different stiffener geometries and analyze the effect that material alignment has on the stiffness of reinforced composite panels.

The University of Texas at El Paso **El Paso, TX**
Graduate Research Assistant Aug 2016-May 2017

- Investigated the **durability and degradation** of the **mechanical properties** of **woven carbon composites** subjected at **room and extreme temperatures**. Mechanical tests were performed on laminated composites: Impact, Compression after impact, Tension, 3-point bending tests and Fatigue.
- This research resulted on **2 Journal publication (Journal of Dynamic Behavior of Materials and Multiscale and Multidisciplinary Modeling)**

Air Force Research Lab

Summer Research Fellow

Supervisor: Vipul Ranatunga Ph.D.

WPAFB, OH

June 2016-August 2016

- Experimentally and computationally **examined the response under impact** of unidirectional prepreg and woven carbon composites with and without interlaminar reinforcement. **Reinforced panels** resulted in a **decrease of damage by 17%** for **additive manufacturing reinforcement** and **10% for ZnO nanowires reinforcement**.
- Woven and unidirectional laminates were manufactured with VARTM process and autoclave manufacturing respectively. Polymer additive manufacturing was used to print the interlaminar reinforcement on unidirectional pre-preg composites. For woven composites, ZnO nanowires interlaminar reinforcement was synthesized on dry fabric.
- Mechanical testing of tension and compression after impact (CAI) were performed on reinforced and non-reinforced unidirectional and woven carbon composite panels were performed.
- The impact test for unidirectional laminates was simulated within the finite element framework with ABAQUS.
- Finite element method (FEA) framework on ABAQUS was used to develop a computational model that simulated the impact test and that can predict the interlaminar regions more susceptible to damage during an impact event. This work was validated experimentally.

The University of Texas at El Paso

Graduate Research Assistant

Faculty Supervisor: Pavana Prabhakar, Ph.D.

El Paso, TX

Aug 2014-May 2016

- Investigated a **novel interlaminar reinforcement** by synthesizing ZnO nanowires on dry woven carbon fabric. This resulted on **enhancing the damage resistance and durability of carbon woven composites** by increasing their interlaminar fracture toughness under **quasi-static** by up to **87%** and **dynamic loading** by **23%**.
- Developed a macro-mechanical computational model in ABAQUS to predict the interlaminar regions more susceptible to damage during a low-velocity impact event for woven carbon fiber composites, which was validated with experimental work.
- Investigated the impact, tension and shear response of composites reinforced with ZnO nanowires.
- Synthesized ZnO nanowires and manufactured reinforced and non-reinforced woven carbon laminates using the VARTM process.
- Performed mechanical testing: tension, impact, 3-point bending and compression after impact (CAI) on reinforced and non-reinforced laminate.
- This research resulted on **two Journal publication (Journal of Sandwich Structures and Materials and Textile Research Journal)** and an internship at **Air Force Research Lab**.

Office of Research and Sponsored Projects (ORSP)

The University of Texas at El Paso

Graduate Research Assistant

El Paso, TX

June 2014-July 2014

- Developed a computational model on a finite element analysis (FEA) framework ABAQUS to predict the behavior of woven carbon composites under Mode-I (tension) with cohesive elements to validate with experimental work.
- Manufactured woven carbon laminates with VARTM process and then conduct mechanical testing to evaluate their fracture toughness.

Campus Office of Undergraduate Research Initiatives

The University of Texas at El Paso

Undergraduate Research Assistant

El Paso, TX

June 2013-May 2014

- Aided in the design and development of a super-critical carbon dioxide external tubular super-heater for solar power towers.
- Simulated and optimized the external tubular super heater with computational tools ANSYS Workbench, GAMBIT, NX 7.5, Solid Works and FLUENT.

- This research project resulted in **efficiency increase by 85%** of solar power receivers while **reducing their maintenance cost**. Currently under construction at **Sandia National Labs**.

EDUCATIONAL EXPERIENCE

The University of Texas at El Paso

Teaching Assistant – MECH 4395 (*Finite Element Analysis*)

El Paso, TX

Fall 2015

- One-on-one tutoring for students.
- Created activities and homework exercises for students.
- Evaluated student performance, provided feedback, and assigned grades for 60 students.

The University of Texas at El Paso

Teaching Assistant – MECH 1305 (*Graphic and Design Fundamentals*)

El Paso, TX

Fall 2014 – spring 2015

- Developed lectures and tests for a total of 180 students.
- Created activities and homework exercises for the students, which involved problem solving and application of what they had learned in their previous classes.
- Evaluated student performance, provided feedback, and assigned grades for 150-180 students per semester.

Educational Projects

Project Leader

El Paso, TX

June 2014-May 2016

- Led and organized the UTEP CO₂ dragster competition for undergraduate mechanical engineering students.
- Developed and created a 2-week section course: “Introduction to Fracking” for Green Energy Materials and Engineering (GEME), emphasizing flipped classroom activities.
- Created 15 YouTube videos for a step-by-step tutorial on the Computer-Aided Design software (NX 9).
- Planned, developed and recorded 20 YouTube videos on selected topics of sustainable energy (solid mechanics, gas turbines, solar collectors, heat exchangers and heat conduction) for flipped classroom undergraduate courses.

The University of Texas at El Paso

Dynamic Learning Framework Developer

El Paso, TX

March 2013-May 2014

- Developed problems for a dynamic learning database for the following classes: Statics, Mechanics of Materials, Engineering Economics, Fluid Mechanics, and Numerical Methods using MATLAB.

The University of Texas at El Paso

Mathematical Sciences Department Peer Leader

El Paso, TX

January 2011-June 2013

- Helped students to better learn Precalculus by creating challenging problems, developing easier ways to better understand the class, and providing after-school tutoring sessions.

PUBLICATIONS

- **A. G. Castellanos**, P. Prabhakar. (2019). “Elucidating the Mechanisms of Damage in Foam Core Sandwich Composites under Impact Loading and Low Temperatures”. *Journal of Sandwich Structures and Materials*. (Under Revision).
- V. Damodoran, **A. G. Castellanos**, M. C. Milostan, P. Prabhakar. (2018). “Improving the Mode-II Interlaminar Fracture Toughness of Polymeric Matrix Composites through Additive Manufacturing”, *Materials and Design*. 157, 60-73. (<https://doi.org/10.1016/j.matdes.2018.07.006>)
- **A. G. Castellanos**, P. Prabhakar. (2018). “Durability and Failure Mechanic of Woven Carbon Composites under Repeated Impact Loading in Arctic Conditions”, *Multiscale and Multidisciplinary Modeling, Experiments and Design*. 1-14. (<https://doi.org/10.1007/s41939-018-0024-x>)
- **A. G. Castellanos**, K. Cinar, I. Guven, P. Prabhakar. (2018). “Low-velocity Impact Response of Woven Carbon Composites in Arctic Conditions”, *Journal of Dynamic Behavior of Materials*. (<https://doi.org/10.1007/s40870-018-0160-8>).

- **A. G. Castellanos**, H. Mawson, V. Burke, P. Prabhakar. (2017). "Cenospheres/Clay Blended Composites for Impact Resistant Tiles", *Construction and Building Materials*. 156, 307-313. (<http://dx.doi.org/10.1016/j.conbuildmat.2017.08.151>)
- **A. G. Castellanos**, M.S. Islam, E. Tarango, Y. Lin, P. Prabhakar. (2017). "Interlaminar Reinforcement for Enhancing Low-Velocity Impact Response of Woven Composites", *Textile Research Journal*. 0(00). 1-11. DOI: 10.1177/0040517517708536
- R. Garcia, **A. G. Castellanos**, and P. Prabhakar. (2017). "Influence of Arctic Seawater Exposure on the Flexural Behavior of Woven Carbon/Vinyl Ester Composites", *Journal of Sandwich Structures and Materials*. 0(00), 1-19 DOI: 10.1177/1099636217710821.
- **A. G. Castellanos**, Md.S. Islam, M.A.I. Shuvo, Y. Lin and P. Prabhakar. (2016). "Nanowire Reinforcement of Woven Composites for Enhancing Interlaminar Fracture Toughness", *Journal of Sandwich Structures and Materials*. 20(1), 70-85. DOI: 10.1177/1099636216650989.
- Md.S. Islam, E. Melendez-Soto, **A. G. Castellanos** and P. Prabhakar. (2015). "Investigation of Woven Composites as Potential Cryogenic Tank Materials", *Cryogenics*, 72(1), 82-89. DOI: 10.1016/j.cryogenics.2015.09.005

CONFERENCES (PROCEEDINGS)

- **A.G. Castellanos** and P. Prabhakar, "Low-velocity Impact Damage of Woven Carbon Sandwich Composites at Low Temperatures", **ASC 2018**, Seattle, WA September 24-26, 2018.
- **A.G. Castellanos** and P. Prabhakar, "Repeated Impact Response Modelling for Woven Carbon Composites at Arctic Temperatures", **ASC 2017**, West Lafayette, IN October 23-25, 2017.
- **A.G. Castellanos** and P. Prabhakar, "Repeated Impact Response of Woven Carbon Composites", **SciTech 2017**, Grapevine, TX January 9-13, 2017 (ID: 2548506)
- R. Garcia, **A.G. Castellanos** and P. Prabhakar, "Flexural Investigation of Woven Composites with Sea Water Exposure", **American Society for Composites 31st Technical Conference and ASTM Committee D30 Meeting**, Williamsburg, VA, September 19-22, 2016.
- **A.G. Castellanos**, Md.S. Islam, S. Quevedo, M.A.I. Shuvo, Y. Lin and P. Prabhakar, "Impact Response of Woven Composites with Interlaminar Reinforcement" **SciTech 2016**, San Diego, CA, January 4-8, 2016.
- Md.S. Islam, R. Avila, **A. G. Castellanos** and P. Prabhakar. "Hybrid Textile Composites as Potential Cryogenic Tank Materials", **SciTech 2016**, San Diego, CA, January 4-8, 2016.
- **A.G. Castellanos**, Md.S. Islam, S. Quevedo, M.A.I. Shuvo, Y. Lin and P. Prabhakar. "Nanowire Stiffening of Woven Composites towards Enhancing Interlaminar Fracture Toughness", **ASC 30th Technical Conference**, East Lansing, MI, September 28-30, 2015.
- Md.S. Islam, **A. G. Castellanos** and P. Prabhakar. "Effect of Curing Induced Parameters during Manufacturing of Textile Composites", **ASC 30th Technical Conference**, East Lansing, MI, September 28-30, 2015.

CONFERENCES (PRESENTATIONS)

- **A. G. Castellanos** and P. Prabhakar, "Microbial Effect on the Durability of Woven Carbon/Vinyl Ester Composites", ICCM22, Melbourne Australia, August 11-16, 2019.
- **A. G. Castellanos** and P. Prabhakar, "Computational Modeling of Low-Velocity Impact Response of Woven Carbon Laminates", ICCM22, Melbourne Australia, August 11-16, 2019.
- **A.G. Castellanos**, Md.S. Islam and P. Prabhakar, "Impact Response of Woven Composites", **6th Southwest Emerging Technology Symposium**, El Paso, TX, April 2016.
- R. Garcia, R. Avila, **A.G. Castellanos** and P. Prabhakar, "Flexural Behavior of Sandwich Composites in Arctic Environment", **11th International Conference on Sandwich Structures**, Florida Atlantic University's SeaTech Campus, Dania Beach, South Ft. Lauderdale, FL, March 20-22, 2016.

- **A.G. Castellanos**, R. Garcia and P. Prabhakar, “Impact Behavior of Woven Composites in Arctic Environment”, **11th International Conference on Sandwich Structures**, Florida Atlantic University’s SeaTech Campus, Dania Beach, South Ft. Lauderdale, FL, March 20-22, 2016.
- **A.G. Castellanos**, Md.S. Islam, S. Quevedo, M.A.I. Shuvo, Y. Lin and P. Prabhakar, “Stiffening of Woven Composites for Enhancing Mode-I Interlaminar Fracture Toughness”, **5th Southwest Energy, Science and Engineering Symposium**, El Paso, TX, April 2015.
- **A. G. Castellanos**, J. Ortega, S. Afrin, and V. Kumar, UTEP “Design of a Super-Critical Carbon Dioxide External Tubular Super-Heater for Solar Power Towers”, **Summer COURI Symposia**, El Paso, TX, April 2014.
- **A. G. Castellanos**, J. Ortega, S. Afrin, V. Kumar, UTEP “Design of a Super-Critical Carbon Dioxide External Tubular Super-Heater for Solar Power Towers”, **4th Southwest Energy, Science and Engineering Symposium**, El Paso, TX, March 2014.
- **A. G. Castellanos**, S. Afrin, V. Kumar, UTEP “Computational Analysis of Flow Distribution for a One Tank Thermal Energy Storage System”, **3rd Southwest Energy, Science and Engineering Symposium**, El Paso, TX, April 2013.

SKILLS

- Proficient with *FEA* and *CFD* software such as **ABAQUS**, **GAMBIT**, **FLUENT** and **ANSYS Workbench**.
- Experienced with numerical analysis and programming using **MATLAB**, **Mathematica**, **Python**, **FORTRAN** and **C++**.
- Experience using **ABAQUS subroutines**.
- Very knowledgeable in *CAD* software such as **NX 4 - NX 10**, **Nastran** and **SolidWorks**.
- Very knowledgeable with **MS Office** (Outlook, Word, Power Point, Publisher, and Excel).
- Microstructure characterization: **XRD**, **SEM** and **Optical microscope**.
- Machines: **CEAST 9340 Drop Tower Impact machine**, **Instron 8801** (3-point bending, tension and Compression after Impact (CAI) tests), **Instron 5969** (3-point bending and double cantilever beam tests (DCB)). **ADMET Fatigue** testing (3-point bending and double cantilever beam tests (DCB)) and **Environmental chamber** (samples were tested at arctic temperatures for End-Notched Flexure (ENF), DCB and Impact)
- Proficient **LaTeX markup language**.
- Basic knowledge of **PLC ladder logic programming**.
- Excellent **project management** skills and **effective problem-solving** engineering skills.
- Experienced **working in groups**, as well as **independently** with little to no supervision.
- Able to **work under pressure**, handle multiple demands, and set priorities.
- Leadership, reliability, responsibility, great organizational and record-keeping skills.
- **Bilingual**, fluent in English and Spanish.
- Proficient in technical report writing and research.
- Excellent communication and people skills and excellent tone of voice.

HONORS AND AWARDS

- Graduate Engineering Research Scholars Fellowship, 2017-2019
- Amelia Earhart Fellowship, 2017-2018
- Aerospace Design and Structures Student paper competition finalist, January 2017
- Graduate student Marshal for the College of Engineering, Spring 2016
- Outstanding Mechanical Engineering student, 2016
- Mascareñas Foundation Outstanding Scholar, 2016
- Office of Research and Sponsored Projects (ORSP), Awardee 2014
- Department of Mechanical Engineering Top Ten Senior, May 2014
- Campus Office for Undergraduate Research Initiatives (COURI) Research Awardee, 2013-2014
- Freeport-McMoRan Copper & Gold Scholarship, 2012-2013
- Dean’s List continuously, Fall 2009-May 2014
- Mascareñas Foundation Scholarship Awardee, Spring 2010-Spring 2016

AFFILIATIONS

- AIAA member, Fall 2014-Present
- ASME member, Fall 2014-Present
- Tau Beta Pi member, Fall 2013-Present
- Alpha Chi National College Honor Society member, Spring 2012-Present
- Pi Tau Sigma member, Fall 2013-Present
- National Society of Collegiate Scholars (NSCS) member since 2011
- Mascareñas Foundation member, Spring 2010-Present

VOLUNTEERING

- Volunteer for local events that include charity work for fundraisers for the Boys and Girls Club of Las Cruces, El Paso Children Hospital's and for the Child's Play charitable organization. January 2013-Present
- Help organize and bring cultural events to the region via the Mascareñas Foundation. (Staff Leader). Spring 2010-Present
- Help organize recreational activities and events in underprivileged community parks via the Mascareñas Foundation. (Organizer) May 2012-May 2017