

Luciano Castillo, PhD

Kenninger Professor of Renewable Energy & Power Systems
Dean's Faculty Fellow for Hispanic Engagement
School of Mechanical Engineering
Purdue University

I. School: Mechanical Engineering

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EDUCATION

PhD Mechanical Engineering, State University of New York at Buffalo, (1997).

- Thesis: *Similarity Analysis of Turbulent Boundary Layers*.
- Advisor: William K. George, Imperial College London

BS Mechanical Engineering, State University of New York at Buffalo, (1990).

II. PROFESSIONAL EXPERIENCE

Kenninger Professor of Renewable Energy & Power Systems,
School of Mechanical Engineering, Purdue University,
West Lafayette, IN. (17- present).

Dean's Faculty Fellow for Hispanic/Latino Engagement
College of Engineering, Purdue University,
West Lafayette, IN. (19- present).

Don-Kay-Clay Cash Distinguished Engineering Chair in Wind Energy, Cluster Strategic Hire). Professor of Mechanical Engineering Department, Texas Tech University, Lubbock, TX (11 - 17).

President/Executive Director, National Wind Resource Center, Lubbock, TX (11 - 14).

Professor, Mechanical, Aerospace & Nuclear Engineering Department, Rensselaer Polytechnic Institute, Troy, NY (11).

Associate Professor, Mechanical, Aerospace & Nuclear Engineering Department, Rensselaer Polytechnic Institute, Troy, NY (04 - 11).

Assistant Professor, Department of Mechanical, Aerospace & Nuclear Engineering, Rensselaer Polytechnic Institute, Troy, NY (99 - 04).

Adjunct Professor, Department of Mechanical Engineering, Johns Hopkins University, Baltimore, MD (09 - present).

Post-Doctoral Fellow, Department of Mechanical & Aerospace Engineering, State University of New York at Buffalo, Buffalo, NY (98 - 99).

Assistant Professor, Department of Mechanical Engineering,
Indiana Institute of Technology, Fort Wayne, IN (97- 98).

III. HONORS AND DISTINCTIONS

Awards

National Academy of Engineering of Mexico- (Foreign Corresponding Member), (2020).

Fellow American Physical Society (APS), (2019).

Fellow American Society of Mechanical Engineers (ASME), (2013).

Rensselaer Trustee Faculty Award, (2005, 2008).

NASA Summer Faculty Fellowship, (2001, 2002).

ASME: Robert T. Knapp Award, Best Paper Award, (2002).

Martin Luther King Jr. Faculty Award, Rensselaer Polytechnic Institute (2002).

Renewable Energy Best Paper Award, (2015).

IEEE Best Paper Award, (2016).

ASME McDonald Award, (2016).

Best Poster Award: GLEAMM Innovation Poster Showcase, Texas Tech University,(2017).

GLEAMM Technology Commercialization Award, Technology Development,¹ (2017).

Finalist Discovery Park Big Idea Challenge 2.0, The Energy Corridor Along the US/Mexico Border: Changing the Conversation. Purdue University, IN (2019).

C-Prep Faculty Award, Fort Wayne, IN (2020).

Keynote & Distinguished Lectures on Wind Energy

College of Engineering Distinguished Lecture - Engineered Bio-inspired Micro-surface on a Wind Turbine Blade: The Case for Renewable Energy on the Water Crisis. College of Engineering, State University of New York at Buffalo, (2018).

Kenninger Distinguished Lecture- The Influence of Bio-inspired Micro-Surface on the Flow Evolution of a Wind Turbine Blade. School of Mechanical Engineering, Purdue University, (2016).

Plenary Lecture- Wind Energy: The Case for the Economic Growth and Sustainable Future for the Caribbean Islands and Latin America. The Latin American and Caribbean Consortium of Engineering Institutions (LACCEI). Dominican Republic, (2015).

¹Commercialization of a technology on bio-inspired micro surface for wind energy applications.

Kenninger Distinguished Lecture- Why Turbulence is a Big Deal on Wind Energy?
School of Mechanical Engineering, Purdue University, (2014).

Texas Academy of Medicine, Engineering & Science.
Invited Speaker-Panelist, (2012).

Keynote- V International Symposium on Energy. The Puerto Rico Energy Center,
Gurabo, PR, (2013).

College of Engineering Distinguished Lecture- National Engineers Week Distinguished Lectures. The Importance of Large Scales of Turbulence in the Energy Entrainment of Wind Arrays. University of Texas-Dallas, Dallas, TX (2013).

Distinguished Lecture- Science Festival. On Wind Energy. Universidad del Sagrado Corazon, San Juan PR (2013).

Keynote- San Angelo Chamber of Commerce. On Wind Farms Underperformance, San Angelo, Texas, (2012).

Keynote Lectures on Diversity

- NASA/NSF Panel Expert on Diversity. VA (2020).
- *In Your Darkest Moments Lies Your Biggest Blessings*
Summer Research Experience, ENLACE
Calibaja Center for Resilient Materials and Systems
University of California, San Diego (2019).
- *The Beauty of Challenges*
Symposium on Research and Graduate Education
Sistema Universitario Ana G. Mendez
San Juan, Puerto Rico, September (2007).
- *Maximizing Your Graduate Degree*
Tech Symposium 2000, Miami, Florida, July, (2000).
- *Creating Your Own Opportunities in the 21st Century*
Syracuse University, Syracuse, N.Y. April, (2000).
- *Pushing the Envelope in Technology by Diversity*
University at Buffalo, SHPE, Buffalo, N.Y., April, (2000).
- *Keynote Speaker for the EOP/Bridge Program Dinner (RPI)*
Rensselaer Polytechnic Institute, Troy, N.Y. Summer, (2000).
- *Closing Ceremony of Hispanic Week at Rensselaer Polytechnic Institute,*
Troy, N.Y., October, (2000).

Editor of Journals & Scientific Committees

Associate Editor for ASME Journal: Solar Energy Engineering: 2018.

International Scientific Committee Member. Wind Energy Science Conference, Copenhagen, Denmark, 2017.

Scientific Committee Member. The Science of Making Torque from Wind (TORQUE 2016). Munich, Germany, 2016.

Associate Editor: Wind Energy Science: 2015- present.

Associate Guest Editor: Whither Turbulence and Big Data In the 21st Century. 2015-2016.

Associate Guest Editor for Journal of Turbulence: Special Volume on Turbulence and Wind Energy, 2011- 2013.

Advisory Board: Johns Hopkins University NSF-IGERT, (2009 - 2013).

Associate Guest Editor for Journal of Turbulence: Issue on Turbulent Boundary Layers, 2008- 2010.

Guest Editor for AIAA Journal: Special Section on Turbulent Boundary Layers, 2005-2006.

Visiting Editor for Physics of Fluids: Special Issue of the Gallery of Fluid Motion, 2003- 2004.

Honors

Endowed Professorship: *Kenninger Professor of Renewable Energy & Power Systems*, Purdue University (2017-present).

Dean's Faculty Fellow, Purdue University, (2019-present).

Endowed Professorship: *Don-Kay-Clay Cash Distinguished Engineering Chair in Wind Energy*, Texas Tech University (2011-2017).

External Reviewer Mechanical & Industrial Engineering Program. University of Illinois at Chicago, Illinois 2016.

NSF Presidential Award for Excellence in Science, Mathematics and Engineering Mentoring. (2015) (nomination).

NSF Committee of Visitors (COV),
Sub-Chair: Site Visit to NSF Program (HRD), (2013).

Key Search Committees: Selected by Upper Administration

Executive Vice President for Research & Partnerships, Purdue University, 2019.

Dean of the College of Engineering, Rensselaer Polytechnic Institute, 2008-2009.

Vice President for Research, Rensselaer Polytechnic Institute, 2007.

Vice-Provost for Diversity, Rensselaer Polytechnic Institute, 2003.

IV. RELEVANT LEADERSHIP EXPERIENCE²

- **USA/Mexico Border Consortium: Changing the Conversation.**

The Future Energy, Water, Industry and Education Park (FEWIEP)- Changing The Conversation.³

1. **Role: Director & Co-Founder of Consortium:** In this initiative, as director and co-founder of this major consortium of more than 30 eminent engineers & scientists we proposed the construction of the biggest and most vibrant technology-driven economic development zone ever built as an alternative to the wall along the 1,989-mile-long US-Mexico border. This border is one of the best areas in the world for harvesting natural gas, solar, and wind energies. A systematic development of this area will allow leveraging of the natural resources in ways that address migration and security concerns. The border states of California, Texas, New Mexico, and Arizona are in the grip of severe to exceptional drought conditions—with critical water problems in the future evident also in the Mexico side. These issues are compounded by human trafficking and lack of employment opportunities. Therefore, the proposed Future Energy, Water, Industry, and Education Park (FEWIEP) aims to solve these unique challenges by transforming the existing border into a vibrant opportunity corridor. By producing wind energy in the Gulf of Mexico and in the Baja California complemented with the generation of solar energy along the border, corporations will seek to desalinate and transport fresh water and generate electricity along the US/Mexico border. The proposed FEWIEP goals are to create unique opportunities for families, enhance security while also promoting the conversion of the deserts in the arid Southwest states into vibrant agricultural farms and industrial innovation centers with unique economic opportunities for Mexico/USA. Consequently, we will create massive opportunities for employment and prosperity along the corridor. This project represents a major endeavor of a magnitude comparable in economic impact to the Panama Canal.
2. **FEWIEP Workshop at University of California San Diego: Co-Chair:** The 1st Future Energy, Water, Industry, and Economy Park (FEWIEP) workshop was held at the University of California San Diego during June 28-29, 2019. This workshop represents a follow-up of the FEWIEP White Paper proposal to build an economic corridor along the border states of both sides of the border. During this two-day event, and in partnership with scientists, engineers, investors and developers, we started discussions of a plan for the development of the US/Mexico border (a 500MW anchor project in Baja California). Key fundamentals questions in terms of partnerships, master plan and anchor project were part of in-depth discussions.
3. **FEWIEP Steering Committee: Director & Co-founder:** Members of the FEWIEP Steering Committee include: **Purdue University:** Luciano Castillo (President), Jay Gore (Vice-President). **University of California San Diego:** Carlos Coimbra: (Chief Technical Lead for Solar Energy), Olivia Graeve (Chief Mexico Liaison). **Universidad Nacional Autónoma de México (UNAM):** Catalina Stern

²Further details of other leadership activities and roles are found in section XV.

³Publications of articles and interviews in section D.

(Mexico Academic Advisor). **Arizona State University:** Ronald Adrian (Chief Technical Advisor). **MAEVA Investments:** Angeline Fournier (Industrial Advisory Board President).

4. Ideas Festival- Purdue 150th Years. What If Event– President Jorge Haddock. Hosted special event with Dean Mung Chiang during February of 2019. President of the University of Puerto Rico Haddock conducted a major lecture on Renewable Energy. Castillo co-organized the event and panel discussion on Renewable Energy.
5. The Prosperity Corridor in Colombia/Venezuela to Address Humanitarian Crisis.
Role: Consortium Lead
Key Partner: Ex-Minister of Energy in Colombia, Hon. Amylkar Acosta Medina
The existing social crisis at the border with Venezuela has displaced over 1.5 million Venezuelans to Colombia alone, and has created financial/social stress as well in neighboring countries in Latin America. Consequently, our team seeks to help solve this problem by building a prosperity zone in Colombia along a portion of the Venezuela border— integrating renewable energy-water-food security to the region and promoting workforce development and innovations to help create an economic rebirth with new jobs in a depressed border zone. Here, we have partners from Colombia: Universidad del Norte; EAFIT; Universidad Nacional de Bogota, Universidad Nacional de Medellin among others.

- **APS-DFD and Purdue University:**

1. Kenninger Summer Research Institute on Renewable Energy (2018, 2019): Established a summer research program for students from Puerto Rico, Latin American and USA. Established partnerships with Ecuador (ESPOL), Peru and Puerto Rico to increase diversity at Purdue. Its impact can be measured as follows: 2 minority students enrolled PhD in School of ME, 1 PhD enrolled in PhD program at Indiana University-Purdue University, and 1 MS in the School of ME.
2. APS-DFD: Minority Scholar Luncheon (2018), (2019).
Created the first minority luncheon at the APS-DFD in Atlanta, 2018.
3. Co-founder Graduate Student Seminar Series: Sandbox Seminar Series at School of Mechanical Engineering at Purdue
Along with colleagues in the department (e.g., Profs. Thomas Siegmund, Jay Gore and support of Prof. Anil Bajaj) we established a seminar series in which graduate students and post-docs present their research in a friendly relax atmosphere. The goal is to help our students become world-class speakers, while also promote research collaborations within the School and training them to succeed in academia and leadership. (Spring 18).
4. APS-DFD: INDY 2022
Selected in 2018 to run APS-DFD at Indianapolis in 2022.
Chair APS-DFD Conference INDY 2022.

5. APS-DFD: Gallery of Fluid Motion
Technical Committee, Gallery of Fluid Motion, American Physical Society, 2003-2004.
6. APS-DFD: 2016- present
(i) Committee on Media & Science Relations, and (ii) Diversity Committee.
7. Major Research & Education Collaborations in Puerto Rico:
University of Puerto Rico and Purdue University. We are developing a major Center for Sustainability and Federal Contracts between both universities including a new dual degree Aerospace (BS and MS), and Summer Research Experience for the faculty of the future.

• **Center Director/President and Endowed Chair at TTU**

1. Symposium Chair: "Whither Turbulence and Big Data In the 21st Century".
Role: Conference Chairman.
The symposium was held in Corsica, France, April 20-24, 2015, dedicating 5 days for in depth discussions on turbulence and big data. It represents a follow-up to the 1989 symposium organized by Prof. J. Lumley to address key fundamental questions in turbulence. Lumley's volume provided a compendium of the state of the art in our understanding of turbulence as at 1989. Consequently, we built on that success to focus on big data in turbulence and the key problems in turbulence for the next 25 years.
2. Campus Wide Leadership.
Established the vision and financial model for integration of all wind efforts on campus at Texas Tech. Resulted in a new Institute (2011-2012). Met several times with a group of about eighty faculty from Engineering, Arts & Sciences, and the Business School; Deans of Engineering, Arts & Sciences, and the Graduate School; the Provost; the VP for Research; and Department Chairs as well as supporting personnel to build and support our vision for the Wind efforts on campus. The idea was to leverage resources and expertise, and lead a world-class team to make TTU a world-class Institution on wind energy. In addition, Castillo met with several members of the Economic Development from West Texas and built partnerships with Industry and National Labs (e.g., NREL, Sandia National Lab, NCAR) as well as the local community to find unique ways that we can assist the Wind Energy Industry to become more successful. Developed an agreement with upper administration to devote a building for this new Center.
3. Established Marketing Plan and Strategic Hires for Center.
Including NAE faculty, endowed chairs, junior faculty, and scientists from industry.
4. The Cash Family Distinguished Lecture in Engineering.
With funds from the Cash Family endowment Castillo created a Distinguished Lecture Series in engineering. Distinguished scientists included members of the NAE, and NAS such as: Ron Adrian, Parviz Moin, Fazle Hussain, and

Richard Tapia. The major outcome of the lectures was that we were able to hire Prof. Hussain in the WCOE as a Presidential Distinguished Professor.

5. Partnerships.
Established more than 25 MOU with academia, national labs and industry from USA, Europe and Australia. Key partnership with GEM Consortium in order to attract 20-30 underrepresented graduate students per year at TTU.
6. Leadership and Vision.
Significant experience in dealing with multi-disciplinary teams, personnel and local community. (i) Established vision and team for an Engineering Research Center on Wind Energy and Water. (ii) Built team for IGERT Proposal on Wind Energy and Entrepreneurship. (iii) Currently, developing the partnerships and agreements with upper administration in order to establish an Incubator. This project will engage industries, faculty and students in the development of new technologies for wind energy performance.
7. NSF Workshop to Build Industrial Partnerships.
In May 2012, Castillo hosted an Industry Consortium Planning Meeting that was attended by 12 industry, academia, economic development and small business development professionals where Dr. Karlene Hoo of the National Science Foundation was the guest speaker. The seminar focused on the funding opportunities available through the National Science Foundation, in particular the (1) Innovation programs of the IIP Partnerships for Innovation: Building Innovation Capacity, and Partnerships for Innovation: Accelerating Innovation Research, Innovation-Corps, Industrial/University Cooperative Research Centers; and (2) Small business programs – SBIR/STTR, and capacity building to utilize these funding sources to commercialize research and leverage expertise.
8. International Wind Energy Symposium (Role: Conference Chairman).
Castillo was instrumental in bringing researchers from around the world (Denmark, Germany, Belgium, Spain) as well as experts from DOE (including the program manager for all Wind Energy programs in USA) and National Labs (e.g., Sandia National Lab, NREL, NCAR) to Texas Tech University.
9. State Wind Energy Meeting.
Under the leadership of Castillo, a major meeting was held in the Dallas-Forth Worth area, which included all major institutions in the State of Texas with the purpose of promoting collaborations in wind energy. A major outcome of this event was that we established the first Texas Fluid Dynamics Conference held in December 2012.
10. Co-organizer of the iTi Conference on Turbulence IV, Italy.
In collaboration with world-class scientists from Italy and Germany, Castillo was part of the organizing committee of the iTi Conference, The major outcome was that the team co-edited a book of the conference proceedings.
11. Symposium on Frontiers of Fluid Dynamics - A Legacy, Puerto Rico.
Chairman of symposium (www.nwrcevents.com). This event will honor the 70th

Birthday of Fazle Hussain, a world-class fluid dynamicist who has contributed in areas related to fluid dynamics in medicine, turbulence, and energy. The event was held in San Juan, Puerto Rico during November 1-3, 2013.

12. Chair and Co-founder: Texas Fluid Dynamics Conference.
Established with Dr. Charles Tinney the first Texas Fluid Dynamics Conference to bring graduate students and faculty from Texas into a relax atmosphere to promote research collaborations in the state of Texas, and focus on graduate students research in fluid dynamics. The first conference was held at the Canyon of the Eagles in 2013.
13. Co-founder: Sandbox Seminar Series at Purdue
Along with colleagues in the department (e.g., Profs. Thomas Siegmund, Jay Gore and support of Prof. Anil Bajaj) we established a seminar series in which graduate students and post-docs present their research in a friendly relax atmosphere. The goal is to help our students become world-class speakers, while also promote research collaborations within the School and training them to succeed in academia and leadership. (Spring 18).

- **Leadership on Diversity**

1. Graduate Summer Research Institute on Renewable Energy. (2017)
Development of a graduate summer research institute in which we attracted minority graduate students to conduct research for 10-weeks in Norway at the Institute for Energy Technology.
2. Promote STEM Fields in Hispanic Community.
Coordinated TV interviews with a local Hispanic Television channel (Telemundo) and the English program for world-class speakers including National Medal of Science, NAE Members and NASA Senior Executive.
3. Summer Research Institute on Energy, and Medicine, (Founder and Director).
During 2013, we created an 8-week Summer Research Institute consisting of 26 STEM students from various Institutions with a distribution of 85% minorities. Students (e.g., mainly undergraduate students) were instructed on the foundations of Math and Physics the first two weeks, and the last 6 weeks conducted research in energy, medicine and aerodynamics. Engaged Faculty, Deans, VP-Research, Provost and President of the University on event and future growth to ensure we increase diversity in graduate programs.

The Second Annual NWRC Summer Research Institute on Energy, Innovation and Medicine began on June 5. In **2014, we recruited 42 students to the program**, 30 of which came from several various US universities, Puerto Rico, Mexico, Cuba, Argentina and the other 12 were TTU students, and 5 were High School students. An award ceremony was held during the symposium to honor the accomplishments of the students throughout the program. A major outcome of the Summer Research Institute are as follows: (i) 3 disclosures of new technologies, (ii) a team created a new startup, (iii) 7 PhD student

enrolled TTU, (iv) a Proceeding of the papers will appear in the fall of 2014, (v) developed a curriculum for wind energy for High School teachers.

4. K-12 Teachers Research Experience.
During 2013 we invited 7 K-12 STEM teachers to engage in research activities as well as world-class scientists (e.g., Richard Tapia (The National Medal of Science and NAE Member), Carlos Castillo- Chavez (Presidential Awardee), and NASA Deputy Director for Education (Dr. Roosevelt Johnson) among others. For two weeks we engaged high school teachers on the fundamentals of wind energy, design, fabrication and performance (power output) testing of wind turbines with the goal of bringing this significant project-based activity to the classroom. A curriculum for K-12 on wind energy was developed for teachers.
5. Faculty Mentor and Leader of Diversity on Campus at RPI. Mentored the Society of Hispanic Professional Engineers student chapter at RPI for several years. Under my leadership and mentoring, the chapter grew to more than 200 active students and won The Best Chapter Award at the national level.
6. Founder and Leader of Diversity Program at RPI- The NSF AGEP.
Created and founded the Alliance for Graduate Education and the Professoriate (AGEP) program, which was funded for an amount of \$5M (including cost share) by the National Science Foundation including: Cornell University, Syracuse University, Rensselaer Polytechnic Institute and the University of Puerto Rico-Mayaguez (UPRM); later, Johns Hopkins University joined the alliance. The program demonstrated great success in recruiting students and mentoring minority and female graduate students. Some of the outcomes include: (i) more than 20 minority students graduated with PhDs.; (ii) 6 PhDs placed in academia including at Georgia Tech, Portland State University, University of Texas-San Antonio, Texas tech University, University of South Florida, Oakland University, University of Turabo and University of Puerto Rico-Mayaguez; and (iii) mentoring of minority faculty resulted in 3 NSF-Career Awards.
7. Lead Diversity Initiative at Texas Tech.
Organized a Workshop at Texas Tech composed of multi-disciplinary Faculty, Deans, Provost, President and Staff to build a visionary road map on diversity and inclusiveness for a cultural transformation that will significantly increase the number of minorities including females in STEM fields at Texas Tech (e.g., 100 minority graduate students in 3.5 years).
8. Partnership between Ecuador (ESPOL) and TTU/UIUC (2014).
Developed research partnership with Escuela Superior Politecnica del Litoral (ESPOL) in Ecuador to attract 12 graduate students to Texas Tech University and University of Illinois-Urbana Champaign. Visits among institutions and dual degrees will enable us to attract a large number of students to USA on wind energy. A proposal was submitted to Ecuador for the amount of \$5M (USD).

V. INTELLECTUAL PROPERTY

- **Invention Disclosures:**

1. Urinary Optical Lab. Invention Disclosure, Issued 2016 at Texas Tech University, Lubbock, Texas, (2016). The non-invasive, non-contact nature of our testing technique, reduces the chances of cross contamination and avoids the use of sterilized disposable containers used to collect and transport urine. The proposed device will make it less expensive and more convenient to monitor kidney (and overall) health more frequently. Additionally, by detecting anomalies early on, it will reduce the cost of treatment.
2. Gecko Micro-Solar Surface. Invention Disclosure, Issued 2015 at Texas Tech University, Lubbock, Texas, (2015). This technology uses bio-inspired surface from the Gecko with the goal to significantly improve the efficiency of solar panels. Current simulations show that it is possible to double the efficiency of existing solar panels by using this micro-surface.
3. Bio-inspired Surface for Drag Reduction. Invention Disclosure, Issued 2012 at Texas Tech University, Lubbock, Texas, (2012). Provisional Patent Application submitted to USPTO in 2014. The technology was license to Atlas in order to deploy the technology to car/trucking industry including NASCAR and Formula 1. Existing testing and experiments showed evidence of about 30% drag reduction.
4. Medical Visual Interface. Invention Disclosure, Issued 2014 at Texas Tech University, and Provisional Patent Application was submitted to USPTO in February 2014. Authors: Luciano Castillo, Namrata Tapase, and Suhas Pol. The purpose of this invention is to allow easy access to medical information in the event of an accident, trauma patients and treatment of any disease including terminal conditions. The Medical Visual Interface integrates existing Electronic Medical Records (EMR) into a single platform with easy visual and interactive interface. This technology resulted in a startup, Med-Vi, LLC co-founded by Castillo in 2014.
5. D-1189: Solar Bio-inspire Micro-Surfaces, (2015). Invention Disclosure, Issued 2015 at Texas Tech University, Lubbock, Texas. Authors: Luciano Castillo, Ali Doosttalab and Burak Aksak. In this technology we are using bio-inspired surfaces to increase thermal efficiency of solar panels.
6. Biometrics Displaying and Navigation Enabled Swimming Goggles. Invention Disclosure, Issued 2014 at Texas Tech University. Authors: Luciano Castillo and Martin Fajardo.

- **Patent Submitted: Provisional Patent Applications**

1. Surface Coating for Reduction of Noise and Vibrations, Inventors: Burak Aksak, Humberto Bocanegra Evans, Luciano Castillo. Submitted in September 2018
2. Bio-inspired Surface for Drag Reduction Applications-D-0911. Authors: B. Aksak and L. Castillo, (2014).

3. Medical Visual Interface. *Graphical User Interface System for Interactive, Hierarchical, Multi-Panel Comprehension of Multi-Format Data-D-1117.*
Authors: Luciano Castillo, Namrata Tapase, and Suhas Pol. (2015).
4. Optical Probe for Real Time Chemical Analysis on a Liquid Jet- D-1270.
Authors: H. Bocanegra Evans and L. Castillo, (2017).

VI. Student Thesis Supervision

A. Master Thesis

(16 Completed, 5 faculty positions, 1 NSF-CAREER Award, 4 in Progress)

- **Clarice Nelson**, Vertical Axis Wind Power Plants. May 2022.
- **Evan R. Sattler**, Analysis of Renewable Energy Power Plants and Artificial Intelligence for Electric and Water Generation in Chula Vista. May 2022.
- **Tanya Purwar**, On the Caribbean Low-level Jet and Its Role on Wind Power Plants. August 2020.
- **Michael Roggenburg**, On the Integration of Hydraulic Wind Turbine with Reverse Osmosis. May 2020.
- **Jose A. Montoya Segnini**, Near the Wall Flow in a Real Human Trachea with Bifurcation, 2019.
- **Scott Watkins**, Bio-inspire Micro Surface Application for Wind Energy and Drag Reduction. May 2018.
- **Santiago Novoa**, Continuous Variable Transmission (CVT) for Wind Farm Energy Production. May 2017.
- **Amelia Taylor**, Experimental Studies in a Scaled Down 3x10 Wind Array. Co-Advise with Prof. Suhas Pol. May 2015.
- **Can Liu**, Direct Numerical Simulations of Thermal Field in a Turbulent Channel Flow with Spanwise Sinusoidal Blowing/Suction. Co-Advise with Prof. Guillermo Araya, December 2013 (completed).
- **James Cardillo**, Direct Numerical Simulations of a Zero Pressure Gradient Turbulent Flows Subject to Surface Roughness. Master of Science, May 2011. Currently Project Engineer at HYDAC Technology Corporation.
- **Samuel Notaro**, A Multi-Scale Approach for Modeling of the Atmospheric Turbulent Boundary Layer Subject to Stratification. Master of Science, August 2011. Entrepreneur.
- **Gustavo Rivera-Rosario**, The Multi-scale Nature of Turbulent Boundary layers Subject to Pressure Gradient and Stratification. Master of Science, December 2011. Currently PhD Student at Cornell University.

- **Donald Chao**, Effect of Roughness in the Development of an Adverse Pressure Gradient Turbulent Boundary Layer. Master of Science, August 2007. Currently at Sikorsky.
- **Sheilla Torres-Nieves**, Turbulent Boundary Layers: Free-Stream Turbulence, Surface Roughness and Favorable Pressure Gradient. Master of Science, August 2007. Currently Associate Professor at University of Puerto Rico-Mayaguez.
- **Jose Lebron-Bosques**, Turbulent Boundary Layers Subject to External Conditions. Master of Science, August 2007. Currently Lecturer at University of Puerto Rico-Mayaguez.
- **Katherine Newhall**, Turbulent Boundary Layers: A Look at Skin Friction, Pressure Gradient, Surface Roughness and The Power Law. Master of Science, August 2006. Currently Assistant Professor at UNC Chapel Hill.
- **Victor Maldonado**, Analytical Modeling & Experimental Validation of a Recirculating Bubble on a Clark-Y Airfoil. Master of Science, Co-advise with M. Amitay, May 2006. Currently Associate Professor at Texas Tech University.
- **Brian Brzek**, Development and Characterization of an Increasing Adverse Pressure Gradient Turbulent Boundary Layers. Master of Science, December 2004. Currently Research Engineer & Project Leader at GE- Global Research Center.
- **Raul B. Cal**, Similarity Analysis for Transpired Turbulent Boundary Layers. Master of Science, September 2003. Currently Full Professor at Portland State University.
- **David Walker**, The Effect of the Initial Conditions on Turbulent Boundary Layers. Master of Science, December 2001. Currently at GE-Global Research Center, Manager of Fluid Mechanics Laboratory Energy & Propulsion Technologies.

B. Doctoral Students:

(15 Completed, 4 in Progress, 9 in tenure-track faculty positions, 2 NSF-CAREER Award)

- **Diego A. Siguenza-Alvarado**, On Synthetic Low Level Jet and Its Interaction with a Scaled-down Wind Farm. (2023).
- **Jhon Quinones Cortes**, On the Venezuelan Humanitarian Crisis: The Role of Renewables and Artificial Intelligence for Electricity and Water Desalination. May 2024.
- **Venkatesh Pulletikurthi**, The Role of Inlet Disturbance on the Offshore Wind Energy and Water Nexus. 2021.
- **Antonio Esquivel**, On Hydraulic Wind Turbines. 2022
- **Ali Doosttalab**, The Role of a Bio-inspired Micro-surface and Roughness in Turbulent Boundary Layer over a Wind Turbine Blade. May 2018.
- **Walter Gutierrez**, Low-Level Jets and Wind Turbine Interactions and their Impacts on Performance, Power Production and Mechanical Responses: A Numerical Approach. December 2017.

- **Suranga Dharmarathne**, LES Simulations of Film Cooling in Turbulent Flows Subject to Pressure Gradient. August 2015.
Currently Assistant Professor, University of Indianapolis.
- **Jensen Newman**, Large Scale Motions and Very Large Scale Motions in Noise Generation of Turbulent Boundary Layers in Wind Turbine Airfoils. Co-advise with D. Drew (RPI- Mathematics Department), August 2013.
Currently Principal Investigator, University of Texas- Dallas.
- **Jie Zhang**, Hybrid and Uncertainty-based Surrogate Modeling with Applications to Wind Energy. Co-Advise with Prof. Achille Messac, (2012).
Currently Assistant Professor at University of Texas-Dallas.
- **Jose Lebron-Bosques**, PIV Measurements of a Scaled-down Wind Farm Subject to Atmospheric Boundary Layer Conditions. Co-advise with C. Meneveau (Johns Hopkins). May 2011. Currently Lecturer at University of Puerto Rico-Mayaguez.
- **Sheilla Torres-Nieves**, Interaction of Turbulent Length Scales with Wind Turbine Blades at High Angles of Attack. Co-advise with C. Meneveau (Johns Hopkins). May 2011. Currently Associate Professor at University of Puerto Rico-Mayaguez.
- **Victor Maldonado**, The Role of Freestream Turbulence and Flow Control on the Aerodynamic Performance of Wind Turbine Blades. August 2012.
Currently Associate Professor at Texas Tech University.
Recipient NSF-CAREER (2018).
- **Souma Chowdhury**, Global Optimization of Onshore & Offshore Wind Farms. Co-advise with A. Messac (Syracuse University), August 2012.
Assistant Professor at SUNY Buffalo (starting January 2016).
- **Guillermo Araya**, Numerical Heat Transfer Analysis in Turbulent Wall Bounded Flows. Doctor of Philosophy, August 2008.
Currently Associate Professor at University of Puerto Rico-Mayaguez.
Recipient NSF-CAREER (2019).
- **Brian Brzek**, Development and Characterization of Adverse Pressure Gradient Turbulent Boundary Layers. Doctor of Philosophy, May 2007.
Currently Research Engineer & Project Leader at GE- Global Research Center.
- **Jorge Bailon-Cuba**, Numerical Study of Rough Surfaces in a Turbulent Channel Flow and Boundary Layer. Doctor of Philosophy, December 2007.
Currently Research Associate at University of Texas-Dallas.
- **Raul B. Cal**, The Favorable Pressure Gradient Turbulent Boundary Layer. Doctor in Philosophy, May 2006.
Currently Tenured Full Professor at Portland State University.
- **Xia Wang**, Similarity Analysis for Turbulent Boundary Layers Subject to Pressure Gradient and Heat Transfer. Doctor of Philosophy, December 2003.
Currently Tenured Full Professor (tenured) at Oakland University.

- **Junghwa Seo-Nolan**, Investigation of the Upstream Conditions and Surface Roughness in Turbulent Boundary Layers. Doctor of Philosophy, May 2003. Currently Research Scientist at Knolls Atomic Power Laboratory.

VII. Post-Doctoral and Visiting Scholars

a. Post Doctoral Research Associates

- Amirkhosro Kazemi, August 2018 - present. at Florida Atlantic University.
- Dr. Ali Doosttalab, August 2018 - present. at Purdue University.
- Dr. Humberto Bocanegra, June 2014- 2018. at Texas Tech University.
- Dr. Walter Gutierrez, 2017- present. at Texas Tech University.
- Dr. Suranga Dharmarathne, 2017- 2018. at Purdue University.
- Sajjad Abedi, 2017 - 2019. at Purdue University.
- Dr. Victor H. Maldonado, August 2012- 2013. at Texas Tech University.
- Dr. Guillermo Arraya, August - December 2008, at Johns Hopkins (co-advised with C. Meneveau).
- Dr. Raul B. Cal, June 2006 June 2007. at Johns Hopkins (co-advised with C. Meneveau).
- Dr. Xia Wang, January 2004 - December 2004. at Rensselaer Polytechnic Institute.

b. Research Professors & Research Scientists

- Humberto Bocanegra, Purdue University, (2019). School of Mechanical Engineering.
- Dr. Guillermo Arraya, August 2011- 2015, Research Assistant Professor, Department of Mechanical Engineering, Texas Tech University.
- Dr. Suhas Pol, January 2013- 2015, Research Assistant Professor, Department of Mechanical Engineering, Texas Tech University.

c. Visiting Scholars from the University of Puerto Rico Mayaguez, Puerto Rico

- Prof. Stefano Leonardi, Adjunct Visiting Scholar, Summer 2007.
- Prof. Antonio Estevez, Visiting Scholar, Summer 2005.

- Prof. Marco Arocha, Visiting Scholar, 2004-2005.
- Prof. Gustavo Gutierrez, Visiting Scholar, Summer 2004, Summer 2005.
- Prof. Jaime Ramirez-Vick, Visiting Scholar, Summer 2004, Summer 2005.
- Prof. Pablo Caseres, Visiting Scholar, Summer 2004, Summer 2003.

d. Visiting Scholars from Europe and USA

- Prof. Gunnar T. Johansson, Visiting Professor, Fall 2001, November 2012.
- Dr. Juan G. Araya, Visiting Scholar, Swansea University, Fall 2009, Spring 2010, Summer 2010.
- Prof. Gerardo Carbajal, Visiting Scholar, Universidad del Turabo, Summer 2013, 2014.
- Dr. Murat Tutkun, Institute for Energy Technology, Norway, Summer 2014.
- Prof. Victor Maldonado, University of Texas-San Antonio. Summer 2014.
- Prof. William Anderson, University of Texas-Dallas. Summer 2014.

e. Purdue Kenninger Summer Research Institute Program. (2018, 2019)

- Dr. Walter Gutierrez, TTU (2018).
- Dr. Humberto Bocanegra, TTU (2018).
- Jossy O'Donnell, SUNY Buffalo, (2018- present).
- Jonathan Carbajal, RPI, (2018).
- Mellissa Hege, Indiana University-Purdue University, (2018).
- Diego A. Siguenza-Alvarado, ESPOL, Ecuador, (2018).
- Antonio Esquivel, Universidad Nacional de Colombia, Colombia, (2018).
- Matthew Szmak, SUNY Buffalo, (2018-present).
- Luis Miguel Leon, Universidad Nacional de Colombia, Colombia, (2018-2019).
- Benjamin Santiago, Universidad del Turabo, (2018).
- Eduardo Fenollal Gines, Universidad del Turabo, (2018).
- Maulin Shah, Purdue University, (2018).
- Matthew Szmak, SUNY Buffalo, (2018-2019).
- Amil Vargas-Castillo, Clarkson University, (2019).
- Harold Reyes, University of Puerto Rico-Mayaguez, (2019).
- Karla J. Romero Pacheco, University of Puerto Rico-Mayaguez, (2019).
- Katiria Lugo Martinez, University of Puerto Rico-Mayaguez, (2019).

VIII. Course and Curriculum Development

MANE 2060- Fundamentals of Flight (RPI)

- * *Study Abroad Experience in Puerto Rico*: Undergraduate students from Rensselaer Polytechnic Institute (RPI) and Universidad del Turabo (UT) in Puerto Rico collaborated for two weeks in projects related to designing, building, and flying of a model aircraft as a capstone design experience. In total, 26 freshmen in Aeronautical Engineering from RPI traveled to Puerto Rico between May 21- June 5 of 2010 where they teamed with seven undergraduates in Mechanical Engineering from UT. This represents the largest number of students abroad at RPI since the creation of the international experience. The two week long experience was organized into academic and cultural components, with the academic component consisting of a main design project. The cultural component included organized visits to popular landmarks. In addition, a journal article was submitted for publication at the International Journal of Engineering Education and program appeared at the Inside Rensselaer Magazine (see articles below).
- * *Building International Experiences Into An Engineering Curriculum - A Design Project Based Approach*. Maldonado, V., Castillo, L., Carbajal, G. and Hajela, P., accepted for publication at *European Journal of Engineering Education*, (2013).
- * *A Soaring Opportunity for Aerospace Freshmen*. Inside Rensselaer Magazine, **Vol. 4**, No. 12, August 27, (2010).

Study Abroad in Peru (Purdue)

- * *ME 590: Study Abroad in Wind Energy - December 2018*. *Integrated wind energy fundamentals in a unique experience in Peru with water challenges and food security. Students in the wind energy class (Fall 2018) were able to bring a test-bed of a Cyber-physical system of a microgrid to show how different inlet wind profiles affect the energy production. In addition, this system included a continuous variable transmission (CVT) to expand the operational point of a hydraulic wind turbine, and evaluate its potential for the region. A series of short presentations and demonstration at UNSA and UNSAAC were be part of the visits. Faculty Mentor include: Profs. L. Castillo (Lead) and David Warsinger.*
- * *Summer Study Abroad in Renewable Energy & Water - Summer 2019*. *Students from broad range of expertise and majors were able to test and deploy a Cyber-physical system of a hydraulic wind turbine-water desalination to show how different inlet wind profiles affect the energy production. In addition, this system included a continuous variable transmission (CVT) to expand the operational point of the wind turbine, and evaluate its potential for the region. A series of short presentations and demonstrations at the Universidad Nacional de San Antonio Abad del Cusco enabled us to work with Peru students and faculty. We deployed, tested and carried out experiments with a new microgrid that integrated renewable*

energy & water desalination in the desert. A scaled-down experiments of wind turbines near Machu-Pichu allowed us to understand how complex topography could affect wind energy production in the Andes. The history of Peru—Inca Empire was explored during site visits and how they employ effectively energy-water-agriculture to build one of the most advanced civilizations in the world. Faculty Mentors include: Prof. Luciano Castillo (Lead), and Prof. David Warsinger.

Senior Design & GEP 200 (Purdue)

* ME 463: Senior Design- Spring 2018

*In this course students we were able to carry out in depth design analysis and build-test prototypes. **Outcome:** In the Malott Design Competition of the 11 sessions of this course two of the top 5 best projects were from my class and the winner team was from my class and **First Place Competition for Best Design.***

* ME 463: Senior Design- Spring 2019

*In this course students we were able to carry out in depth design analysis and build-test prototypes in renewable energy & health care. **Outcome:** In the Malott Design Competition of the 11 sessions of this course two of the top 5 best projects were from my class and the winner team was from my class and **Second Place.***

* GEP 200 – Research and Design for Global Engineering Grand Challenges: Faculty Mentor. *In this course, I participated as faculty mentor of a freshmen team (4 students during Spring of 2019. **First Place Poster Competition.** First time ever any freshmen group win including graduate students and undergraduates. Project focus on wind energy performance in complex topography of Machu-Pichu.*

MANE 6530- Turbulence Spring 2000 (RPI)

- * Taught using distance education between Clarkson University, UC Santa Barbara, SUNY Buffalo and RPI. Two conference articles were published and presented in China.
- * *A Multi-University Internet-based (H.323) Graduate Course in Turbulence, Part I: Academic Description.* Wang, H., George, W.K., Meng, H., Stephens, L., Fellendorf, B., Whitlock, J., Glauser, M.N., Dullea, D., Castillo, L., Hayes, W., Smith, E., Hoshida, S., Koritschan, P., Casterlin R., Shurtleff, D. and Ewing, D., ICEE 2000, Taipei, Taiwan, (2000).
- * *A Multi-University Internet-based (H.323) Graduate Course in Turbulence, Part II: Technical Details.* Stephens, L., Fellendorf, B., Whitlock, J., Wang, H., Meng, H., George, W.K., Dullea, D., Glauser, M.N., Smith, E., Hayes, W., Castillo, L., Hoshida, S., Koritschan, P., Casterlin, R. and Shurtleff, D., ICEE 2000, Taipei, Taiwan, (2000).

MANE 4010 (RPI)/ME 3322 (TTU)- Thermo Fluids II

- * Involved in the development of this course into a studio format which integrates the use of laptops and active learning.

- * At TTU implemented team-building concepts, including design and innovations.
- * Students, design, test and build prototypes on projects related to energy storage, water dissemination, renewable energy, biometrics sensors for medical fields, fitness and, education as it relates to thermodynamic cycles (e.g. Rankin cycle, refrigeration cycle etc.).
- * Built collaborations with College of Education to develop best practices of how to introduce design and innovation early on engineering student careers. We are currently writing a journal article on this topic.

IX. Publications

A1. Book Chapters

1. Influence of Upstream Perturbations on Wall Heat Transfer via Large-Scale Motions. Pulletikurthi V., Dharmarathne S., Hussain F., Castillo L. Editors: Örlü R., Talamelli A., Peinke J., Oberlack M. (eds). Progress in Turbulence VIII. iTi 2018. Springer Proceedings in Physics, vol 226. Springer, Cham. (2019).
2. Analysis of Velocity Structures in a Transitionally Rough Turbulent Boundary layer. Doosttalab, A., Dharmarathne, S., Tutkun, M., Adrian, R. and Castillo, L., *Whither Turbulence and Big Data in the 21st Century?*, Editors: Pollard, A., Castillo, L., Danaila, L. and Glauser, M. ISBN: 978-3-319-41215-3, ISBN: 978-3-319-41217-7 (eBook). Springer, (2016).
3. Free-stream Turbulence Effects on the Flow Around an S809 Wind Turbine Airfoil. Torres-Nieves, S., Maldonado, V., Lebron, J., Kang, H.S., Meneveau, C. and Castillo, L., *Progress in Turbulence & Wind Energy IV, Springer Proceedings in Physics*, (2012).
4. DNS of Turbulent Boundary Layers Subjected to Adverse Pressure Gradient. Araya, L. and Castillo, L., *Progress in Turbulence & Wind Energy IV, Springer Proceedings in Physics*, (2012).
5. Isotropic Free-stream Turbulence Promotes Anisotropy in a Turbulent Boundary Layer. Torres-Nieves, S.N., Lebrón, J.R., Brzek, B., Cal, R.B., Meneveau, C. and Castillo, L., Editors: Eckhardt, B., *Advances in Turbulence XII, Springer Proceedings in Physics, Vol. 132*, ISBN: 978-3-642-03084-0 (Print) 978-3-642-03085-7 (Online), pp. 581-584, (2009).
6. Generation of Turbulent Inlet Conditions for Velocity/Thermal Boundary Layer Simulation. Araya, G., Bohr, E., Jansen, K. and Castillo, L., Progress in Turbulence II. Editors: Oberlack, M., Guenther, S., Weller, T., Khujadze, G., Osman, A., Frewer M. and Peinke, J., *Springer Proceedings in Physics, Vol. 109*, pp. 145-149, Springer, ISBN: 978-3-540-32602-1, Germany (2007).
7. Near Wall Measurements in Rough Surface Turbulent Boundary Layers. Brzek, B., Cal, R., Johansson, G. and Castillo, L., *Advances in Turbulence XI*, Editors: Palma, J.M.L.M. and Silva Lopes, A., *Springer Proceedings in Physics, Vol. 117*, ISBN-978-3-540-72603-6 (Print) 978-3-540-72604-3 (Online), pp. 295-297, (2007).

8. Upstream Conditions Effects on the Anisotropy of Rough Favorable Pressure Gradient Turbulent Boundary Layers. Cal, R.B., Brzek, B., Johansson, G. and Castillo, L., *Advances in Turbulence XI*, Editors: J.M.L.M. Palma and A. Silva Lopes. *Springer Proceedings in Physics*, **Vol. 117**, ISBN 978-3-540-72603-6, (2007).
9. Thermal Boundary Layers Simulations Under Adverse Pressure Gradients. Araya, G., Jansen, K. and Castillo, L., *Advances in Turbulence XI*, Editors: J.M.L.M. Palma and A. Silva Lopes. *Springer Proceedings in Physics* **Vol. 117**, pp. 743, ISSN 0930-8989, ISBN 978-3-540-72603-6 (Print) 978-3-540-72604-3 (Online), (2007).
10. The Asymptotic Profiles in Forced Convection Turbulent Boundary Layers. Castillo, L. and Wang, X., IUTAM Symposium on Reynolds Number Scaling in Turbulent Flow. Editor: Smits, A.J., *Fluid Mechanics and Its Applications*, **Vol. 74**, pp 191-194, Kluwer Academic Publishers, ISBN-1-4020-1775-8, Norwell, MA (2004).
11. Scaling Laws and Measurements on Adverse Pressure Gradient Turbulent Boundary Layers. Brzek, B., Anderson, C., Turan, O.F. and Castillo, L., *Advances in Turbulence*. Editors: Anderson, H.I. and Krogstad, P. A., In: Proceedings of the Tenth European Turbulence Conference, International Center for Numerical Methods in Engineering, ISBN 84-95999-55-2, pp 867, Trondheim, Norway, (2004).
12. Scaling Turbulent Boundary Layers with Suction or Blowing. Cal, R.B. and Castillo, L., Symposium on Reynolds Number Scaling in Turbulent Flow. Editor: Alexander J. Smits, *Fluid Mechanics and Its Application*, **Vol. 74**, pp 195-199, Kluwer Academic Publishers, ISBN-1-4020-1775-8, Norwell, MA (2004).
13. LDA Measurements in Turbulent Boundary Layers with Zero Pressure Gradient. Johansson, G.T. and Castillo, L., *Proceedings of Turbulence Shear Flow Phenomena*, Editors: Lindborg, E., Johansson, A., Eaton, J., Humprey, J., Kasagi, N., Leschziner M. and Sommerfeld, M., *2nd International Symposium*, **Vol. 2**. KTH, Stockholm, June (2001).
14. Application of Zagarola/Smits Scaling in Turbulent Boundary Layers with Pressure Gradient. Castillo, L., *Advances in Fluids Mechanics III*, Editors, M. Rahman and C.A. Brebbia, **26**, pp 275-288, WIT Press, ISBN 1-85312-813-9, (2000).

A2. Books

1. Whither Turbulence and Big Data in the 21st Century?, Editors: Pollard, A., Castillo, L., Danaila, L. and Glauser, M. ISBN: 978-3-319-41215-3, ISBN: 978-3-319-41217-7 (eBook). *Springer*, (2016).



Figure 1: Books Edited and Co-edited by Luciano Castillo.

2. TTU & WINDINSPIRE Summer Research Institute Proceedings in Renewable Energy & Medicine. Editors: Castillo, L., Carbajal, G. and Gadel-Hak, M. ISBN-10:0-9826115-0-1. (2015).
3. Proceedings for the 2013 Symposium on Frontiers of Fluid Dynamics, A Legacy. A Tribute to Fazole Hussain. Editor: Castillo, L., *National Wind Resource Center*, ISBN:978-0-9903627-0-8. (2014).
4. NWRC Summer Research Institute Proceedings in Renewable Energy, Turbulence & Medicine. Editors: Castillo, L., Pol, S., Aksak, B., Ruiz-Columbie, A. *National Wind Resource Center*, ISBN-13: 978-0-9903627-1-5, (2014).
5. Progress in Turbulence and Wind Energy IV, Proceedings of the iTi Conference in Turbulence 2010. Editors: M. Oberlack, J. Peinke, A. Talamelli, L. Castillo, and M. Holling. Springer Proceedings in Physics, **141**, ISBN: 978-3-642-28967-5, Berling Heidelberg, (2012).

B. Peer Review Journal Articles

1. Auspicious Locations in the United States for Population Development with the Support of Renewable Energy. Gutierrez, W. and Castillo, L., under review, **Renewable and Sustainable Energy Reviews, Review Article**. (2020).
2. Socioeconomic Equality through Clean Energy Access. O'Donnell, J., Bocanegra Evans, H., Doosttalab, A., Gutierrez, W., Abedi, S., Warsinger, D., Niyogi, D., and L. Castillo, under review in *Energy Policy*, (2020).
3. A Bold Proposal for Easing the Venezuela-Colombia Migrant Crisis. Castillo, L. **Scientific American**, February 17, (2020).
4. Techno-economic Analysis of a Hydraulic Transmission for Floating Off-shore Wind Turbines. Roggenburg, M., Esquivel-Puentes, H.A., Vacca, A., Bocanegra Evans, H., Garcia-Bravo, J., Warsinger, D.M., Ivantysynova, M., and Castillo, L., <https://doi.org/10.1016/j.renene.2020.02.060>, *Renewable Energy*, (2020).
5. On the Low Level Jets and Its Role on Power Production of a Scaled-down Wind Farm. Doosttalab, A., Bocanegra Evans, H., Chamorro, L., and Castillo, L., under review **PNAS**, (2020).
6. On the Large- and Small-scale Motions in a Separated, Turbulent-boundary-layer Flow. Suranga Dharmarathne, Humberto Bocanegra Evans, Ali M. Hamed, Burak Aksak, Leonardo P. Chamorro, Murat Tatkun, Ali Doosttalab and Luciano Castillo. <https://doi.org/10.1080/14685248.2019.1683186>, *Journal of Turbulence*, 20, no. 9 (2019): 563-576. (2019).
7. The Structural Response of a Wind Turbine under Operating Conditions with a Low-Level Jet. Gutierrez, W., Ruiz-Columbie, A., Tutkun, M. & Castillo, L. **Renewable Sustainable Energy Reviews**, Volume 108, July 2019, Pages 380-391, (2019). **Review Article**
8. Engineered Bio-inspired Coating for Passive Flow Control. Bocanegra Evans, H., Hamed, A.M., Gorumlu, S., Doosttalab, A., Aksak, B., Chamorro, L.P. and Castillo, L., <https://doi.org/10.1073/pnas.1715567115>, Volume 115, Number 6, Proc. Nat. Acad. Sci. (**PNAS**), (2018).
9. Coherent Structures and their Relation to Hot/Cold Spots in a Thermal Turbulent Channel Flow. Dharmarathne, S., Pulletikurthi, V., & Castillo, L. *Fluids*, 3(1), 14, (2018).
10. Renewable Energy Saves Water and Creates Jobs Castillo, L., Gutierrez, W. and Gore, J. **Scientific American**, August 7, (2018).
11. Non-renewable Energy's Other Environmental Problem: Water Waste. Castillo, L. and Gutierrez, W. **Axios**, December 21, (2018).
12. Flow Modulation by a Mushroom-Shaped Surface Coating on a Wind Turbine Airfoil Section. Doosttalab, A., Dharmarathne, S., Bocanegra Evans, H., Hamed, A., Gorumlu, S., Aksak, B., Chamorro, L., Tutkun, M. and Castillo, L. *Journal of Renewable and Sustainable Energy*, 10, no. 4 (2018): 043305, (2018).

13. Flow Recirculation in Cartilaginous Ring Cavities of Human Trachea Model. Montoya Segnini, J., Bocanegra Evans, H., Castillo, L. (2018). *Journal of Aerosol Medicine and Pulmonary Drug Delivery*, 31(6), 331-338.
14. Evaluation of RANS CFD in the Study of Respiratory System Fluid Dynamics. Montoya Segnini, J., Hege, M., Doosttalab, A., Bocanegra Evans, H., Castillo, L. under review *Journal of Aerosol Medicine and Pulmonary Drug Delivery*, (2018).
15. Buoyancy Jump at Wind Turbine Wake Interface. Pol, S., Taylor, A. and Castillo, L. 114 (2017) 1224-1231 *Renewable Energy*, (2017).
16. Turbulent Boundary Layer Response to Large-scale Wavy Topographies. Hamed, A.M., Castillo, L. and Chamorro, L.P., 29, 065113m, *Physics of Fluids*, (2017).
17. Impacts of the Low-level Jet's Negative Wind Shear on the Wind Turbine. Gutierrez, W., Ruiz-Columbie, A., Tutkun, M. and Castillo, L., *Wind Energy Science*, 2, 533545, (2017).
18. The Logarithmic and Power Law Behaviors of the Accelerating, Turbulent Thermal Boundary Layer. Castillo, L. and Hussain, F., *Physics of Fluids*, **29**, 020718 (2017).
19. Holographic Microscopy and Microfluidics Platform for Measuring Wall Stress and 3D Flow Over Surfaces Textured by Micro-pillars. Bocanegra, H., Gorumlu, S., Aksak, B., Sheng, S. and Castillo, L., **Scientific Reports- Nature**, 6, Article number: 28753 (2016). doi:10.1038/srep28753.
20. Structures of Scalar Transport in a Turbulent Channel. Dharmarathne, S., Tutkun, M., Araya, G. and Castillo, L., *European Journal of Mechanics B-Fluids*, 55, pp. 259-271 (2016).
21. Structural Impact Assessment of Low Level Jets over Wind Turbines. Gutierrez, W., Araya, G., Kiliyanpilakkil, P., Ruiz-Columbie, A., Tutkun, M. and Castillo, L., *Journal of Sustainability and Sustainable Energy*, **8**, 023308, (2016).
22. Index-matched Measurements of the Effect of Cartilaginous Rings on Tracheobronchial Flow. Bocanegra, H. and Castillo, L., *Journal of Biomechanics*, **49** pp.1601-1606, (2016).
23. The Log Behaviour of the Reynolds Shear Stress in Accelerating Turbulent Boundary Layers. Araya, G., Castillo, L. and Hussain, F. *Journal of Fluid Mechanics*, vol. 775, pp. 189-200, (2015).
24. Buoyancy Effects on the Scaling Characteristics of Atmospheric Boundary Layer Wind Fields in the Mesoscale Range. V. P. Kiliyanpilakkil, S. Basu, A. Ruiz-Columbie, G. Araya, L. Castillo, B. Hirth, and W. Burgett. *Phys. Rev. E*, 92, 033005 (2015).
25. Effect of Small Roughness Elements on Thermal Statistics of Turbulent Boundary Layer at Moderate Reynolds Number. Doosttalab, A., Araya, G., Newman, J., Adrian, R. and Castillo, L. *Journal of Fluid Mechanics*, vol. 787, pp. 84115. (2015).

26. Turbulent Boundary Layer Over 2D and 3D Large-scale Wavy Walls. Hamed, A. M., Kamdar, A., Castillo, L. and Chamorro, L. P. *Physics of Fluids*, vol. 27, 106601 (2015).
27. The Role of Free Stream Turbulence with Large Integral Scale on the Aerodynamic Performance of an Experimental Low Reynolds Number S809 Wind Turbine Blade. Victor Maldonado, Luciano Castillo, Adrien Thormann, Charles Meneveau. *Journal of Wind Eng. Ind. Aerodyn.* 142, 246-257, (2015).
28. The Effects of Blade Number in a Scaled Wind Turbine Array. , Newman, J., Cal, R.B. and Castillo, L., *Renewable Energy*, 81, pp. 472-481, (2015).
29. Building International Experiences Into An Engineering Curriculum A Design Project Based Approach. Maldonado, V., Castillo, L., Carbajal, G., and Hajela, P., *European Journal of Engineering Education*, DOI:10.1080/03043797.2013.874979, (2014). **Education Article**
30. A Reduced-Order Model of the Mean Properties of a Turbulent Wall Boundary Layer at a Zero Pressure Gradient. Xu, L., Rusak, Z., and Castillo, L., *Journal of Fluids Engineering*, Vol. 136 / 031103, pp.1-16, (2014).
31. Pseudo Spectral Analysis of the Energy Entrainment in a Scaled Down Wind Farm. Newman, J., Drew, D. and Castillo, L., *Renewable Energy*, Vol. 70, pp. 129-141. (2014).
32. Field Measurements in the Wake of a Model Turbine, Pol S., Taylor A., Bilbao A., Doostalab A., Novoa S., Westergaard C., Hussain F., Sheng J., Ren B., Gissleman M., Glausser M., and Castillo L (2014). *Journal of Physics: Conference Series*, **Vol 524**, Issue 1, p012175, DOI: 10.1088/1742-6596/524/1/012175.
33. Toward Understanding Low Level Jet Climatology over West Texas and its Impact on Wind Energy. Gutierrez W., Araya G., Basu S., Ruiz-Columbie A., and Castillo L., *Journal of Physics: Conference Series*, **524** (2014) 012008. doi:10.1088/1742-6596/524/1/012008.
34. DNS of a Turbulent Boundary Layer with Surface Roughness. Cardillo, J., Chen, Y., Araya, G., Newman, J., Jansen, K. and Castillo, L., *Journal of Fluid Mechanics*, **Vol. 729**, pp. 603-637.(2013).
35. Streamwise Development of the Wind Turbine Boundary Layer Over a Scaled Down Wind Array. Jensen, N., Lebron, J., Meneveau, C., and Castillo, L., *Physics of Fluids*, **25**, 085108, (2013).
36. A Multivariate and Multimodal Wind Distribution Model. Zhang, J., Chowdhury, S., Messac, A. and Castillo, L., *Renewable Energy*, **51**, 436-447, (2013).
37. Optimizing the Arrangement and the Selection of Turbines for a Wind Farm Subject to Varying Wind Conditions. Chowdhury, S., Zhang, J., Messac, A. and Castillo, L., *Renewable Energy*, **52**, pp. 273- 282, (2013).
38. DNS of Turbulent Thermal Boundary Layers Subjected to Adverse Streamwise Pressure Gradients. Araya, G. and Castillo, L., *Physics of Fluids*, **25**, 095107, (2013).

39. Adaptive Hybrid Surrogate Modeling for Complex Systems. J. Zhang, S. Chowdhury, J. Zhang, A. Messac, and L. Castillo. *AIAA Journal*, **Vol.** 51, No. 3, pp. 643-656, (2013).
40. Foreword: A Special Issue on Turbulence and Wind Energy. Castillo, L., Dabiri, J., Naughton, J. and Meneveau, C., *Journal of Turbulence*, **Vol.** 14, Issue 4, DOI:10.1080/14685248.2013.800702, (2013).
41. Unrestricted Wind Farm Layout Optimization (UWFLO): Investigating Key Factors Influencing the Maximum Power Generation. Chowdhury, S., Zhang, J., Messac, A. and Castillo, L., *Renewable Energy*, **vol.** 38 (1), pp. 16-30, (2012).
2015 Best Paper Award Renewable Energy (most cited article).
42. Experimental Study of the Kinetic Energy Budget in a Wind Turbine Stream-tube. Lebron, J., Castillo, L. and Meneveau, C., *Journal of Turbulence*, **vol.** 13, DOI:10.1080/14685248.2012.705005, (2012).
43. DNS of Turbulent Thermal Boundary Layers up to $Re_\theta = 2300$. Araya, G., and Castillo, L., *Int. Journal of Heat and Mass Transfer*, **vol.** 55, Issues 1516, 4003-4019, (2012).
44. A Response Surface-based Cost Model for Wind Farm Design. J. Zhang, S. Chowdhury, A. Messac, and L. Castillo. *Energy Policy*, **42**:538-550, (2012).
45. A Dynamic Multi-scale Approach for Turbulent Inflow Boundary Conditions in Spatially Evolving Flows. Araya, G., Castillo, L., Meneveau, C. and Jansen, K., *Journal of Fluid Mechanics*, **vol.** 670, pp. 581605, (2011).
46. Steady and Time-periodic Blowing/Suction Perturbations in a Turbulent Channel Flow. Araya G., Leonardi S. and Castillo L., *Physica D: Nonlinear Phenomena*, **vol.** 240, Issue 1, pp. 59-77, DOI:10.1016/j.physd.2010.08.006, (2011).
47. Experimental Study of the Horizontally Averaged Flow Structure in a Model Wind-turbine Array Boundary Layer. Cal, R.B., Lebron, J., Castillo, L., Kang. H.S. and Meneveau, C., *Journal of Sustainability and Sustainable Energy*, **2**, 013106, (2010).
One of the most cited articles in the journal.
48. Introduction: Special Issue on Turbulent Boundary Layers at the AIAA 5th Theoretical Fluid Mechanics Conference. Castillo, L., *Journal of Turbulence*, **Vol.** 11, No. 40, DOI: 10.1080/14685248.2010.522786, (2010).
49. Characterizing Developing Adverse Pressure Gradient Flows Subject to Surface Roughness. Brzek, B., Chao. D., Ozden, T. and Castillo, L., *Experiments in Fluids*, **Vol.** 48, Issue 4, pp. 663-677, DOI 10.1007/s00348-009-0759-6, (2010).
50. DNS of Spatially Evolving Flows via Multi-Scale Similarity Method. Araya, G., Jansen, K. and Castillo, L., *Journal of Turbulence*, **Vol.** 10, No. 36, pp. 1-33 (2009).

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E. Publications on Water for Energy Crisis: Broad Dissemination to the Public

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2. Abstracts

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3. *Effect of Complex Terrains on Wind Energy Production*. Moser, Abigail Elaine, Kaitlin Kelsey, Tae Hyung Kwon, Clarice Nelson, Percy Miguel Rueda Puelles, and Luciano Castillo. *Bulletin of the American Physical Society* (2019).
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120. Turbulent Boundary Layers on Rough Surface. Seo, J. and Castillo, L., *American Physical Society-Division of Fluid Dynamics, 56th Annual Meeting*, November 23-25, NJ, abstract #EA.003, (2003).
121. A New Composite Temperature Profile in Forced Convection Turbulent Boundary Layers. Wang, X. and Castillo, L., *American Physical Society, Division of Fluid Dynamics, 56th Annual Meeting*, November 23-25, East Rutherford, New Jersey, Meeting ID: DFD03, abstract #DA.006, (2003).
122. Self-similar Solutions in Forced Convection Turbulent Boundary Layer Subject to External Pressure Gradient. Wang, X. and Castillo, L., *American Physical Society- Division of Fluid Dynamics, 55th Annual Meeting*, Austin, Texas, November 24-26, abstract #AH.009, (2002)
123. Finite Domain versus Infinite Domain Solutions in Turbulent Boundary layers. Castillo, L. and Seo, J., *American Physical Society, Division of Fluid Dynamics 55th Annual Meeting*, Austin, Texas, November 24-26, abstract #AH.008, (2002).
124. Pressure Gradient Turbulent Boundary Layers Subject to Suction or Blowing. Cal, R. and Castillo, L., *American Physical Society, Division of Fluid Dynamics 55th Annual Meeting*, Austin, Texas, November 24-26, abstract #AH.010, (2002).
125. High Reynolds Number Turbulent Boundary Layer Over a Rough Surface. Castillo, L., Seo, J., Johansson, T.G. and Hangan, H., *54th Annual Meeting American Physical Society - Division of Fluid Dynamics*, San Diego, California, November 18-20, abstract #EF.008, (2001).
126. Non-equilibrium Turbulent Boundary Layers. Castillo, L. and Wang, X., *54th Annual Meeting American Physical Society- Division of Fluid Dynamics*, San Diego, California, November, abstract #FF.003, (2001).
127. Pressure Gradient Boundary Layers with Eventual Separation. Wang, X., Castillo, L. and George, W.K., *54th Annual Meeting American Physical Society- Division of Fluid Dynamics*, San Diego, California, November, abstract #FF.003, (2001).

- can Physical Society- Division of Fluid Dynamics*, San Diego, California, November 18-20, abstract #FF.008, (2001).
128. Zero Pressure Gradient Turbulent Boundary Layer at $R_\theta \approx 120,000$. Seo, J., Castillo, L., Hangan, H. and Johansson, T.G., *54th Annual Meeting American Physical Society-Division of Fluid Dynamics*, San Diego, California, November, abstract #JF.013, (2001).
 129. The Effects of the Upstream Conditions in Turbulent Boundary Layers with Pressure Gradient. Walker, D.J. and Castillo, L., *1000 Island Fluids Mechanics Conference*, Canada, abstract #AC.002, (2000).
 130. LDA Measurements in a Low to Moderate Reynolds number Flat Plate Turbulent Boundary Layer Experiment. Johansson, T.G. and Castillo, L., *53rd American Physical Society - Division of Fluids Dynamics*, Washington D.C., November 19-21, abstract #MC.001, (2000).
 131. Improvement to the George/Castillo Boundary Layer Theory. Wosnik, M., George, W.K., and Castillo, L., *American Physical Society - 53rd Annual Meeting of the Division of Fluid Dynamics*, Washington D.C., November 19-21, abstract #AC.007, (2000).
 132. The Effect of the Upstream Conditions in a Low Reynolds number Turbulent Boundary Layer with Zero Pressure Gradient. Castillo, L. and Johansson, T.G., *American Physical Society-Division of Fluids Dynamics*, Washington D.C., November 18-22, (2000).
 133. The Upstream Dependence of Turbulent Boundary Layers with and without Pressure Gradient. Walker, D.J. and Castillo, L., *American Physical Society, 53rd Annual Meeting of the Division of Fluid Dynamics*, November 19 - 21, Washington, D.C., abstract #AC.001, (2000).
 134. Effect of Upstream Conditions on the Velocity Deficit Profile of Turbulent Boundary Layers. Castillo, L. and George, W.K., *American Physical Society- Division of Fluid Dynamics*, New Orleans, Louisiana, November 20-23, abstract #AA.01, (1999).
 135. Similarity Theory for Boundary Layers with Pressure Gradient. Castillo, L., *American Physical Society, Division of Fluid Dynamics Meeting*, November 23-25, abstract #1a.08, (1997).

3. Research Reports

1. Progress Report: Don-Kay-Clay Cash Distinguished Engineering Chair in Wind Energy. (2012 - 2016).
2. Workshop: Wind Farms Underperformance the National Wind Resource Center, Lubbock, Texas, Winter 2011. Final Report, (2012).
3. Numerical & Experimental Studies in Developing Turbulent Flows Via Multi-Scale Similarity. NSF and ONR Annual Reports. (2008-2012). (5 Reports).
4. New York State Science and Technology Academic Research. (2002-2007), (5 Reports).

5. The NSF-AGEP: CNY-PR Alliance. NSF-HRD, (2003-2008), **Diversity Program**. (6 Reports).
6. Wind Turbine - atmospheric Boundary Layer Interactions: Detailed Model Experiments and Multiscale Analysis. NSF- Award CBET-0730922, Reports (2007-2010). (3 Reports).
7. Investigation of the Initial Conditions and Surface Roughness in Turbulent Boundary layers. Annual Project Report, Office of Naval Research, (2003-2009). (6 Reports).
8. Critical Emergent Design Issues in Wind Energy Production: Guidelines for Maximizing the Economic Impact of Wind Turbine Array. NSF- Award CMMI-0946765, Report (2009-2010).
9. Investigation of the Flow-Induced Vibration in the E2 Test Facility. NASA Stennis Space Center , Internal Report for Faculty Summer Fellowship. (2001).
10. Zero Pressure Gradient Turbulent Boundary Layer. George, W.K., Castillo, L., and Knecht, P., Turbulent Research Lab Report, TRL 153, Department of Mechanical and Aerospace Engineering, State University of New York at Buffalo, Buffalo (1996).

X. RESEARCH GRANTS & CONTRACTS

A. Proposals Approved & Funded:

1. GLEAMM Spark Fund- TTU. **Surface Coating for Flow Separation Control and Energy Efficiency: Commercialization**. PIs: Castillo, L., Aksak, B. and Bocanegra Evans, H. Duration: 2017 (six months). Total Amount: \$52,000.
2. National Science Foundation (NSF-IIP) **NSF-I-CORPS: On-the-Go Urinalysis Optical Lab Technology**. PI: Castillo, L. and Co-PI: Bocanegra, H. Duration: 2016. Total Amount: \$50,000.
3. National Science Foundation (NSF-CBET) and Office of Naval Research (ONR). **NSF/ONR (International): The Role of Inlet Perturbations on Superstructures of Turbulent Boundary Layers- Toward Global Flow Control**. PI: Castillo, L. (TTU), Co-PI: Araya, G. (TTU) and Nick Hutchins. Duration: 2015- 2018. Total Amount: \$457,372 (USA) and \$300,000 (Australia).
4. National Science Foundation (NSF-CBET). **Whither Turbulence and Big Data In the 21st Century**. PI: Castillo, L., Co-PI: Glauser, M. (USA), Pollard, A. (Canada) and Danaila, L. (France). Duration: 2015-2016. Total Amount: \$30,000.
5. National Science Foundation (NSF-IIP). **I-Corps Teams: A Cyber Infrastructure Medical Visual Interface Technology**. PI: Castillo, L. Duration: 2015. Total Amount: \$50,000.
6. National Science Foundation (NSF-CBET). **Symposium on Frontiers of Fluid Dynamics-A Legacy**. PI: Castillo, L., Co-PI: G. Araya. Duration: 2013- 2014. Total Amount: \$15,000.

7. National Science Foundation (NSF-PIRE), Sub-award from The Johns Hopkins University- Charles Meneveau (PI). **USA/Europe Partnership for Integrated Research & Education in Wind Energy Intermittency: From Wind Farm Turbulence to Economic Management.** PI at TTU: Castillo, L., Duration: 2012- 2017.
Total Amount: \$754,000 at TTU.
8. GE Global Research. **Numerical Analysis of Film Cooling on Turbulent Spatially-developing Boundary Layers.** PI: Araya, G., Co-PI: Castillo, L., Duration: 2011 - 2012. Total Amount: \$24,076.
9. National Science Foundation (NSF-CBET). **Workshop: On Wind Farm Underperformance- An Industrial Perspective.** PI: Castillo, L., Duration: 2011- 2012. Total Amount: \$20,000.
10. National Science Foundation (NSF- CBET. Collaborative Research: **Large-scale Kinetic Energy Entrainment in the Wind Turbine Array Boundary Layer: Understanding and Affecting Basic Flow Physics.** PI: Castillo, L., Duration: 2011- 2014. Total Amount: \$197,154.
11. National Science Foundation (NSF-CCMI). **System of Systems Approach and Uncertainty Mitigation/Exploitation for Wind Farm Design: Addressing the 2020 Challenge.**
PI: Messac, A. (SU), (Total Amount: \$222,687); Co-PI: Castillo, L., Duration: 2011- 2014. (Total Amount: \$179,899) at TTU.
Total Amount: \$402,586.
12. National Science Foundation (NSF-CBET). **Workshop: The World Alliance on Turbulence and Wind Energy.** PI: Castillo, L. (RPI); Co-PIs: Messac, A., (SU), Carbajal, G., Loran, R., Allison, J., Duration: 2010- 2011.
Total Amount: \$10,000.
13. TeraGrid: **DNS of Turbulent Spatially Evolving Boundary Layers with Rough Surfaces at High Reynolds numbers.** PI: Castillo, L. and Co-PI: Araya, G., Duration: 2010- 2011.
Computational Allocation: 400,000 Us.
14. National Science Foundation (NSF-CBET) & Co-funded with Office of Naval Research (ONR). **Numerical & Experimental Turbulence in Pressure Gradient Turbulent Boundary Layers.**
PI: Castillo, L., Duration: 2008- 2011. Total Amount: \$416,000.
15. National Science Foundation (NSF-CMMI). **Critical Emergent Design Issues in Wind Energy Production: Guidelines for Maximizing the Economic Impact of Wind Turbine Array.** PI: Castillo, L, .Duration: 2009- 2011.
Total Amount: \$89,988.
16. TerraGrid: **LES and DNS of Turbulent Spatially Evolving Boundary Layers in Pressure Gradient Flows Via Multi-Scale Method** PI: Castillo, L., Duration: 2007- 2008. Computational Allocation: 224,000 Us.
17. National Science Foundation, (NSF-DGE). **GK-12: Building Bridges from High School to Grad School: Inspiring Students Through**

Discovery-based Activities in Energy and the Environment.

PI: Kaminski, D. (\$547,605), Co-PIs: Borca, D. (\$547,605), Castillo, L.

(\$547,605), Borland, T. (\$547,605) and Wei, T. (\$547,605). Duration: 2008- 2013. Total Amount: \$2,738,025.

18. TeraGrid. **Thermal Boundary Layer Simulations under Adverse Pressure Gradient.** PI: Castillo, L.; Co-PI: Jansen, K., Duration: 2006- 2007.
Computational Allocation: 30,000 Us.
19. National Science Foundation (NSF-CBET). Energy for Sustainability Program. **Wind Turbine-atmospheric Boundary Layer Interactions: Model Experiments and Implications on Numerical Simulations.** PI: Meneveau, C. (Johns Hopkins University: \$317,372); Co-PI: Castillo, L. (\$56,000 + Travel Sabbatical: \$16,000). Duration: 2007- 2010. Total Amount: \$373,371.
20. National Science Foundation (NSF-DGE). Graduate Student Fellowship. **Adverse Pressure Gradient Turbulent Boundary Layers.** Sheilla Torres-Nieves (PhD Student)/ Castillo, L. (Advisor). Duration: 2007- 2010.
Total Amount: \$90,000.
21. Office of Naval Research (ONR). **Investigation of Adverse Pressure Gradient.** PI: Castillo, L., Duration: 2006- 2007.
Total Amount: \$70,000.
22. Ford Foundation Pre-doctoral Fellowship. Sheilla Torres-Nieves (PhD Student)/ Castillo, L. (Advisor). **Adverse Pressure Gradient Turbulent Boundary Layers.** Duration: 2007- 2010. Total Amount: \$60,000.
23. National Science Foundation (NSF-DGE). Graduate Student Fellowship. Newhall, K. (Graduate Student)/ Castillo, L. (Advisor). **Asymptotic Method and Modeling of Rough Surface Turbulent Boundary Layers.** Duration: 2005- 2008.
Total Amount: \$90,000.
24. New York State Science and Technology Academic Research (NYS-TAR). *Strategically Targeted for Academic Research Center at Syracuse University*, **Wind tunnel Design and Construction.** PI: Bogucz, E. (Syracuse University), Co-PIs: Castillo, L., Figueiro. Duration: 2002- 2007.
Total Amount: \$1,300,000 for Castillo at Rensselaer.
25. The National Aeronautics and Space Administration (NASA) - Stennis Space Center⁴. **Flow Induced Vibration.** PI: Castillo, L., Duration: 2002- 2003. Total Amount: \$66,000.
26. National Science Foundation (NSF-HRD). *Alliances For Graduate Education and the Professoriate (AGEP)*. **The Central New York to Puerto Rico Alliance for Graduate Education and Professoriate.** Lead Institute: Syracuse University - PI: Spina, E. (Provost, amount

⁴Sub-contract from University of Puerto Rico-Mayaguez, Project PI: Jia, Y.

over \$5M with cost-sharing). Co-PI: Castillo, L.,
Total Amount at RPI. \$1,500,000. Duration: 2002- 2007.

27. Office of Naval Research (ONR): **Investigation of Adverse Pressure Gradient in Smooth/Rough Surfaces**. PI: Castillo, L., Duration: 2003- 2006. Total Amount: \$299,000.

B. Proposals Pending:

1. Peru, (UNSAAC): **A Renewable Energy and Water Co-Production Microgrid for Cusco**. PI: Castillo, L. and Co-PI: Warsinger, D. Pending. Total Amount: \$1,700,000. (2018).
2. NIH: National Institute of Environmental Health and Safety. **Effect of cilia on airway particle deposition**, PI: Luciano Castillo, co-PI: Humberto Bocanegra Evans Total Amount: \$275,000. (2019)

XI. Professional and Public Lectures: (Presented by L. Castillo)

Invited Papers

1. DNS of Wall-bounded Flows and the Role of External Conditions on the Flow Evolution. Engineering Mechanics Institute (EMI)- 2017. San Diego, CA, (2017). Invited Paper.
2. Invited Presentation: 1st International Symposium on Energy Challenges & Mechanics. Scotland, UK, July 8-10, (2014).
3. Upstream Condition Influence on Transitionally Rough Favorable Pressure Gradient Turbulent Boundary Layers. 37th AIAA Fluid Dynamics Conference and Exhibit, AIAA 2007-3992, Miami, FL, June 25-28, (2007). Invited Paper.
4. Evolution of the Favorable Pressure Gradient Turbulent Boundary layer Towards a Quasi-Laminar State. 36th AIAA Fluid Dynamics Conference and Exhibit, AIAA-2006-2883, June 5-8 San Francisco, CA, (2006). Invited Paper.

Invited Seminars

1. Building Prosperities Corridors in Latin America: Implications for Colombia. School of Engineering. Universidad Nacional de Los Andes. Bogota, Colombia, (2020).
2. On Building Prosperities Corridors in Latin America. School of Engineering. Universidad Nacional. Bogota, Colombia (2020).
3. On The Energy Corridor along the USA-Mexico Border. Department of Chemical Engineering. University of Cincinnati. OH (2020).
4. The Energy Corridor along the US-Mexico Border: Building Prosperity Corridors in Latin America. Office of the Vice-President for Research. University of Oklahoma, (2020).
5. The Energy Corridor along the USA-Mexico Border. National Renewable Energy Lab. Boulder, CO (2020).

6. The Wealth of Energy along the US-Mexico Border: Changing the Conversation. Department of Mechanical, Aerospace and Nuclear Engineering. RPI, (2019).
7. The Green Energy Corridor along the US-Mexico Border: Changing the Conversation. Department of Chemical Engineering. University of Puerto Rico-Mayaguez, (2019).
8. Modulation of a Cilia-like Micro-Surface on the Flow Evolution of a Wind Turbine Blade. Department of Civil Engineering. University of Notre Dame, (2019).
9. The Green Energy Corridor along the US-Mexico Border: Changing the Conversation. Department of Mechanical Engineering. University of Texas-Dallas, (2019).
10. Water for Energy (W4E) Access to Energy Toward Social Equality. Universidad Nacional del Altiplano, (2019).
11. Water for Energy (W4E) : The Quiet Crisis in the Making. Applied Research Lab. Penn State University, (2019).
12. The Energy Corridor along the US-Mexico Border. College of Engineering, University of Notre Dame, (2019).
13. The Green Energy Corridor along the US-Mexico Border: Changing the Conversation. GEP-200 Class, Purdue University, (2019).
14. W4E & Access to Energy Toward Social Equality. School of Science, University of Puerto Rico-Rio Piedras, San Juan Puerto Rico (2018).
15. Inner and Outer Flow Modulation of a Bio-inspired Micro-surface on a Wind Turbine Blade. Aerospace Department. Virginia Tech, Virginia (2018).
16. Energy is King- On Water for Energy. School of Engineering. University of Turabo. Puerto Rico (2018).
17. W4E & Access to Energy Toward Social Equality. 2018 Borlaug Summer Institute on Global Food Security. West Lafayette, Indiana, (2018).
18. On Water for Energy (W4E) and Energy Toward Social Equality. Department of Civil Engineering. University of Puerto Rico-Mayaguez, Puerto Rico, (2018).
19. Engineered Bio-inspired Micro- surface on a Wind Turbine Blade: Water for Energy the Quite Crisis. Department of Aerospace Engineering. Iowa State University. Iowa (2018).
20. Water for Energy (W4E) Access to Energy Toward Social Equality. Department of Mechanical & Aerospace Engineering. Notre Dame University, Indiana (2018).
21. Water for Energy (W4E) The Quiet Crisis. National Renewable Energy. Colorado (2018).
22. Modulation of a Cilia-like Micro-Surface on the Flow Evolution of a Wind Turbine Blade. University of Texas-Austin, PECOS. Austin, Texas (2017).

23. Modulation of a Mushroom Like Micro-Surface on the Flow Evolution of a Wind Turbine Blade. Department of Mechanical & Industrial Engineering. University of Massachusetts Amherst, Amherst, MA (2017).
24. The Quiet Crisis- Water for Energy. Department of Mechanical, University of Texas-Dallas. (2017).
25. Flow Modulation of a Bio-inspired Micro-surface on a Wind Turbine Blade. Department of Mechanical & Aerospace Engineering. Clarkson University. (2017).
26. The Case for Turbulence in Wind Energy: From Wind Plant Performance down to Single Wind Turbine Blade. Department of Mechanical & Industrial Engineering. University of Illinois-Chicago, IL (2017).
27. Near the Wall Flow in Bio-inspired Surface for Wind Energy. Department of Mechanical Engineering. University of Turabo, Gurabo, PR (2017).
28. The Case for Turbulence on Wind Energy. Department of Mechanical Engineering. City University of New York, NY (2017).
29. Grand Challenge #4: The Case for Wind Energy in Food Security. Castillo, L. and Gutierrez, W., 2017. Borlaug Summer Institute on Global Food Security. West Lafayette, Indiana, USA: Purdue Center for Global Food Security. Retrieved from <http://www.purdue.edu/discoverypark/food/docs/borlaug/2017-SI-Schedule.pdf>. (2017).
30. Modulation of a Bio-inspired Micro-Surface on the Flow Evolution of a Wind Turbine Blade. Department of Ocean Mechanical Engineering. Florida Atlantic University. Boca Raton, FL (2017).
31. The Influence of Bio-inspired Micro-Surface on the Flow Evolution of a Wind Turbine Blade. School of Mechanical Engineering. Purdue University, West Lafayette, IN (2016).
Kenninger Lecture.
32. How to Succeed in Graduate School. College of Engineering, University of Turabo. Puerto Rico (2016).
33. Applications of Fluid Dynamics in Renewable Energy. Department of Mechanical Engineering. University of Turabo, Gurabo, PR (2016).
34. Turbulence the Big White Elephant on Wind Energy. Department of Mechanical Engineering, Universidad EAFIT, Medellin, **Colombia** (2015).
35. The Large Scale Motion of Turbulence in Wind Energy Performance. Department of Mechanical & Industrial Engineering. University of Massachusetts Amherst, Amherst, MA (2015).
36. The Duality of the Accelerating Thermal Turbulent Flow. Department of Mechanical Engineering. Portland State University, Oregon (20015).
37. Why Turbulence is a Big Deal in Wind Energy? Department of Mechanical Engineering. University of Turabo, Gurabo, PR (2015).

38. The Truth About the Quasi-laminar Turbulent Boundary Layer. Mechanical Science and Engineering. University of Illinois Urbana-Champaign. Champaign, Illinois (2014)
39. The Importance of Large Scale Motion of Turbulence in Wind Energy Performance. Department of Mechanical Engineering. Escuela Superior Politecnica del Litoral (ESPOL). Quito, **Ecuador** (2014).
40. Pseudo Spectral Analysis of the Energy Entrainment in a Scaled Down Wind Farm. Department of Mathematics. Rice University. Houston, TX (2014).
41. Why Turbulence is a Big Deal on Wind Energy? School of Mechanical Engineering. Purdue University, West Lafayette, IN (2014).
Kenninger Lecture.
42. On Wind Energy- It is all about Turbulence. Department of Mechanical Engineering, University of North Carolina-Charlotte. Charlotte, NC (2014).
43. Why Turbulence is a Big Deal in Wind Energy? Department of Mechanical Engineering, University of Cincinnati, Oh (2014).
44. Turbulence: The Big White Elephant in Wind Energy. Department of Mechanical Engineering, Cornell University, Ithaca, NY (2014).
45. On Wind Plant Aerodynamics. Department of Aerospace Engineering, Virginia Tech, Virginia (2013).
46. Large Scales of Turbulence on Wind Energy Performance. Department of Mechanical Engineering, Universidad Federico Santa Maria, Valparaiso, **Chile** (2013).
47. Wind Plant Aerodynamics: On Large Scales of Turbulence on Wind Energy. Department of Mechanical Engineering, Pontificia Universidad Catolica de Chile, Valparaiso, **Chile** (2013).
48. The Importance of Turbulence on Wind Energy. Department of Mechanical & Aerospace Engineering, Monash University, Melbourne, **Australia**, (2013).
49. On Wind Energy: It is About Turbulence. Department of Mechanical Engineering, Melbourne University, Melbourne, **Australia**, (2013).
50. Two versus Three Blades Rotors in Wind Energy Performance and Energy Entrainment. Department of Mechanical Engineering, Southern Methodist University, TX (2013).
51. Spectral Analysis in Wind Farm Performance and Energy Entrainment. Department of Mechanical Engineering, University of Puerto Rico-Mayaguez, PR (2013).
52. On Large Scales of Turbulence in the Energy Entrainment of Wind Arrays. Department of Mechanical Aerospace Engineering, Syracuse University, NY (2013).

53. Research Center on Sustainability and Human Potential: A Focus on the Y-Generation, Scholarship and Incubators of the Future. University of Texas-Dallas, TX (2013).
54. Large Scales of Turbulence in the Energy Entrainment of Wind Arrays. Department of Civil Engineering, University of Minnesota, Minnesota (2012).
55. The Role of Turbulence in the Energy Exchange in Wind Turbine Arrays and Aerodynamics Performance. Denmark Technology University/ Riso, **Denmark** (2012).
56. The Role of External Conditions on the Aerodynamic Performance Wind Turbine Blades. GE, Wind Power, Greenville, South Carolina, (2012).
57. Large Scales Motion in Turbulence on Wind Energy. Department of Mechanical Aerospace Engineering, Arizona State University, Arizona (2012).
58. The Role of Turbulence in the Energy Exchange in Wind Turbine Arrays. GE, Wind Power, Greenville, South Carolina, (2012).
59. Large Scales Motion of Turbulence in Wind Energy. Department of Aerospace Engineering, Iowa State University, Iowa (2012).
60. The Importance of Turbulence on Wind Energy. National Center For Atmospheric Research, Boulder, Colorado (2012).
61. On Turbulence and Wind Energy at Various Scales. National Center for Renewable Energy, Boulder, Colorado (2012).
62. Undergraduate Research Experience: ÒA MUSTÓ. College of Arts & Science, San Juan, PR (2012).
63. The Role of Turbulence in Wind Farm Underperformance and Entrainment of Kinetic Energy. Department of Aerospace Engineering, University of Texas-Austin, Austin, TX (2011).
64. The Importance of Turbulence in Wind Energy. GE Global Research, Niskayuna, NY (2011).
65. The NWRC in Texas and the Role of Turbulence in Wind Arrays Underperformance. Department of Mechanical Engineering, University of Rome 2, Rome, **Italy** (2011).
66. DNS of Turbulent Boundary Layers with Surface Roughness. Department of Aerospace Engineering, University of Rome La Sapienza, Rome, **Italy** (2011).
67. On Wind Energy: The Role of Turbulence in Energy Exchange in an Array and Impact on Single Blades . Department of Aerospace Engineering, Texas A&M University, Texas (2011).
68. On Wind Energy: The Importance of Turbulence in Energy Exchange and External Loads. Vestas America, Houston, Texas (2011).
69. On Turbulence and Wind Energy. Department of Aerospace Engineering, Virginia Tech, Virginia (2011).

70. On Wind Energy: A Fundamental Perspective Toward Understanding Wind Farms Underperformance. Sandia National Laboratory, Albuquerque, New Mexico (2012).
71. The Role of Turbulence in Wind Energy: From Single Blade to Array. Department of Oceanography, University of Miami, Miami, Florida (2012).
72. POD Analysis and Large Scales Motions of Turbulence in Wind Arrays. Department of Civil Engineering, University of Minnesota, Minneapolis, Minnesota (2012).
73. On Wind Energy: It is All About Turbulence. University of Minnesota, Department of Mechanical Engineering, Minnesota, April (2010).
74. Large Scale of Turbulence in Boundary Layers. Department of Mechanical Engineering, Portland State University, October (2010).
75. A Multiscale Scale Dynamic Approach for Spatially-evolving Flows. Cornell University, Sibley School of Mechanical and Aerospace Engineering, Ithaca, March (2010).
76. Wind Energy & Turbulence. University of Puerto Rico-Mayaguez, Department of Mechanical Engineering, Puerto Rico, March (2010).
77. DNS for ZPG & APG Flows via Similarity Analysis. University of Rome 2, Department of Mechanical Engineering, Rome, **Italy**. May (2009).
78. Generation of Turbulent Inlet Conditions in LES/DNS for Spatially Evolving Flows via Similarity Analysis. University of Minnesota, Department of Civil Engineering, Minneapolis, Minnesota, March (2008).
79. Highly Turbulent Freestream Over Rough Surface Turbulent Boundary Layers. Air Force Research Laboratory, Dayton, OH, January (2008).
80. International Collaboration Initiative On Renewable Energy. Municipality of Caguas, Presented to Hon. Major William Miranda Marin, Caguas, Puerto Rico. March, (2007).
81. International Center for Energy and Sustainability. Brookhaven National Lab, NY. February, (2007).
82. Application of Equilibrium Similarity in Pressure Gradient Experiments and Simulations. The Johns Hopkins University, MD. February, (2006).
83. The MANE Department at Rensselaer. Colegio de Ingenieros de Venezuela, Caracas, **Venezuela**, September (2006).
84. The Climate Wind Tunnel Simulator & Multi-Disciplinary Center. Puerto Rico Industrial Development Company, San Juan, PR, (2006).
85. Multi-Disciplinary Center. Major of Caguas, November, PR, (2006).
86. Rough Surface Turbulent Boundary Layers its Initial Conditions. Department of Mechanical Engineering, Polytechnic University of New York, February (2004).
87. Turbulent Boundary Layers: The Effect of Roughness & Upstream Conditions on the Downstream Flow. Department of Mechanical Engineering, University of Rome La Sapienza, Rome, **Italy**, September (2004).

88. On Rough Surface Turbulent Boundary Layers. Victoria University, **Australia**, August (2003).
89. Investigation of the Upstream Conditions and Surface Roughness in Turbulent Boundary Layers. University of Puerto Rico-Mayaguez, Puerto Rico, May (2003).
90. Investigation of Various Effects in Turbulent Boundary Layers. University of Manitoba, Winnipeg, **Canada**, March (2003).
91. Asymptotic Solutions in Forced Convection Turbulent Boundary Layers Subject to External Pressure Gradient. Department of Mechanical Engineering, City University of New York, January, (2003).
92. Equilibrium and Non-equilibrium Turbulent Boundary Layers. University of Minnesota, Department of Civil Engineering. February, (2002).
93. Flow Induced Vibration. NASA Stennis Space Center, Mississippi, (2001).
94. On Boundary Layers at High Reynolds Number. NAVY-Large Cavitation Water Tunnel, Memphis, Tennessee, (2001).
95. Maximizing Your Graduate Degree. Tech Symposium 2000, Miami Beach, Florida July 19-22, (2000).
96. EquilibriumType Similarity Analysis in Turbulent Boundary Layers. University of Western Ontario, London, **Canada**, May 22, (2000).
97. Creating your Own Opportunities in the 21st Century. Society of Hispanic Professional Engineers, SHPE, Syracuse University, Syracuse, NY, April 29, (2000).
98. Pushing the Envelop in Technology by Diversity, Society of Hispanic Professional Engineers, University at Buffalo, Buffalo, April 21, (2000).
99. New Perspectives in Turbulent Boundary Layers. Rensselaer Polytechnic Institute Math Department, April 14, (2000).
100. Application of EquilibriumType Similarity Analysis in Turbulent Boundary Layers. Clarkson University, Potsdam, NY April 4, (2000).
101. New Understanding of Turbulent Boundary layers with Pressure Gradient. Department of Thermo-Fluid Sciences, Chalmers University of Technology, Gothenburg, **Sweden**, June, (1999).
102. Similarity of Turbulent Boundary Layers with Pressure Gradient. Department of Mechanics, Swedish Royal Institute of Technology (KTH), Wall Jet Meeting, Stockholm, **Sweden**, June, (1999).
103. A Breakthrough in Turbulent Boundary layers with Pressure Gradient. ONR, Division of Fluid Mechanics, Office of Naval Research, Virginia, April, (1999).
104. Pressure Gradient Turbulent Boundary Layers: The Outer Flow. Department of Mechanical Engineering, Rensselaer Polytechnic Institute, February, (1999).
105. Pressure Gradient Turbulent Boundary Layers: The Outer Flow. Department of Mechanical Engineering, University of Puerto Rico, Mayaguez

Campus,
Mayaguez, Puerto Rico, February, (1999).

106. The Zero Pressure Gradient Turbulent Boundary Layers. Department of Turbomachinery, Praxair, Buffalo, NY. November, (1996).

Contributed Papers and Lectures

1. The Innovation Energy Corridor Along the US/Mexico Border: Changing the Conversation. Sempra Energy, San Diego, CA, (2019).
2. Wind Energy - The Case for the Economic Growth and Sustainable Future for Latin America, Bogota, Colombia, September 4, (2015). Castillo, L., *2nd International Interdisciplinary Workshop on Mathematical Modeling, Ecology, Evolution and Dynamics of Dengue and Related Diseases*. Bogota, **Colombia**, August 31- September 4, (2015).
3. Preliminary Tests at a Model Smart Wind Farm Facility in Texas. Taylor, A., Pol, S., Novoa, S. and Castillo, L., *1st International Symposium on Energy Challenges & Mechanics*, Scotland, **UK**, July 8-10, (2014). **Invited Talk.**
4. Simulations of Spatially Evolving Flows via Multi-scale Dynamic Equilibrium Approach. Castillo, L. and Araya, G. *Wall Turbulence: A Colloquium under the Midnight Sun*. Trondheim, **Norway**, June 22-24, (2014).
5. Laboratory Approaches to Wind Energy. University of Notre Dame. *Workshop on Microscale Modeling of Complex-Terrain Flows*. South Bend, IN. September 25-26, (2014).
6. On Large Scales of Turbulence in the Energy Entrainment of Wind Farms. Castillo, L., *137th OMICS Group Conference. International Conference and Exhibition on Mechanical Aerospace Engineering*. September 30 - October 2, (2013) Hilton San Antonio Airport, USA.
7. The Structure of the Wind Turbine Array/ Atmospheric Boundary Layer Interface. Castillo, L. and Newman, J., *66th Annual Meeting of the APS Division of Fluid Dynamics*, Volume 58, Number 18, Pittsburgh, Pennsylvania. abstract #M19.00005, (2013).
8. The Role of Turbulence in the Energy Exchange in Wind Turbine Arrays and Aerodynamics Performance. Society of Professional Engineers. Dallas, TX, (2012).
9. A POD Analysis of Rough Surface Pressure and Temperature Fluctuations in a Spatially Developing Turbulent Boundary Layer. Castillo, L., Newman, J., Adrian, R. and Chen, Y., *65th Annual Meeting of the American Physical Society Division of Fluid Dynamics*, 2012, San Diego, CA. abstract # H22.00005, (2012).
10. DNS of Very Strong Adverse Pressure Gradient Flows with Eventual Separation. Araya, G., and Castillo, L., *APS 64th DFD*, Baltimore Convention Center, Baltimore, MD, November 20- 22, abstract# A12.0000, (2011).

11. DNS of Turbulent Boundary Layer Subject Strong Adverse Pressure Gradient. *American Physical Society, 63rd Annual Meeting of the APS Division of Fluid Dynamics*, vol. 55, No. 16, Long Beach, California, November 21-23, (2010).
12. Onshore Wind Power: Wind Energy & Turbulence. *2010 Advanced Energy Conference*, New York, New York (2010).
13. DNS of Very Strong Adverse Pressure Gradient Flows with Separation. *iTi Conference on Turbulence IV*, Bertinoro, **Italy**, (2010).
14. DNS of Turbulent Boundary Layer Subject to Surface Roughness. ONR Annual Program Review, Annapolis, Maryland, (2010).
15. Numerical & Experimental Studies in Developing Turbulent Flows Via Multi-Scale Similarity. ONR Annual Program Review, University of California at San Diego, (2009).
16. DNS of Turbulent Boundary Layers with/without External Pressure Gradient Based on a Multi-Scale, Dynamic Recycle Inflow Condition Approach. *American Physical Society-Division of Fluid Dynamics, 62th Annual Meeting*, Minneapolis, Minnesota, November 22-24, (2009).
17. A New Dynamic Model for LES/DNS for Spatially Evolving Turbulent Boundary Layers Based on Multi-Scale Similarity. ONR Annual Program Review, Baltimore, Maryland (2008).
18. Smooth & Rough Favorable Pressure Gradient Turbulent Boundary Layers: The Inner Flow. *5th Theoretical Fluid Mechanics Conference*, AIAA-2008-4346, Seattle, Washington, June (2008).
19. Highly Turbulent Freestream Over Rough Surface Turbulent Boundary Layers. *46th Aerospace Sciences Meeting & Exhibit*, AIAA-2008-0644, Reno, Nevada January (2008).
20. Initial Conditions Effects on Turbulent Boundary layers Subjected to Favorable Pressure Gradient. *4th Theoretical Fluid Mechanics Conference*, AIAA-2005-4812, Toronto, Canada, (2005).
21. Scaling of Favorable Pressure Gradient Turbulent Boundary layers with Eventual Relaminarization. *Proceedings of FEDSM 05, ASME Fluids Engineering Summer Conference*, FEDSM-2005-77486, Houston, Texas (2005).
22. Scaling Laws and Measurements on Adverse Pressure Gradient Turbulent Boundary Layers. *43rd Aerospace Sciences, Meeting & Exhibit*, AIAA-2005-0111, January 10-13, pp 1-13, Reno, Nevada, (2005).
23. Velocity Profiler Similarity-Based Technique for Measuring the Shear Stress. *California Institute of Technology*, February 5-6, (2004).
24. Scaling Laws and Measurements on Adverse Pressure Gradient Turbulent Boundary Layers. *Advances in Turbulence X, Proceedings of the Tenth European Turbulence Conference*, Trondheim, **Norway**, (2004).

25. Similarity Analysis in Transpired Turbulent Boundary Layers Subject to Force Convection and External Pressure Gradient. 42nd Aerospace Sciences, Meeting & Exhibit, AIAA-2004-1288, January 5-8, Reno, Nevada, (2004).
26. Rough Surface Turbulent Boundary Layer: The Composite Profile. 42nd Aerospace Sciences, Meeting & Exhibit, AIAA-2004-1287, January 5-8, Reno, Nevada, (2004).
27. Scaling Laws for Inflow Generation Technique for Large Eddy Simulation for Turbulent Boundary Layer. American Physical Society, DFD 57th Vol 49, No. 9, Seattle Washington, November 21- 23, (2004).
28. The Asymptotic Profiles in Forced Convection Turbulent Boundary Layers. IUTAM Symposium on Reynolds Number Scaling in Turbulent Flow, Princeton University, NJ, (2003).
29. The Composite Profile Forced Convection Turbulent Boundary Layer with and without Pressure Gradient. ASME Summer Fluids Meeting-FEDSM-2003, Hawaii, (2003).
30. Self-Similar Solutions in Turbulent Boundary Layers. 41st Aerospace Sciences Meeting & Exhibit, AIAA-2002-0612, Reno, Nevada, January (2003).
31. Equilibrium, Self-Preserving and Self-Similar Solutions in Diffuser Flows with Developing Inlet. American Physical Society Division of Fluid Dynamics, NJ, (2003).
32. Self-Similar Solutions in Forced Convection. 9th Latin American Congress of Heat and Mass Transfer, San Juan, PR, (2002).
33. Experimental Investigation of the Effect of Upstream Conditions on Smooth and Rough Zero Pressure Gradient Turbulent Boundary Layer Flows at very High Reynolds numbers. 2002, Joint US ASME-European Fluids Engineering Summer Conference, FEDSM 2002-31069, Montreal, **Canada**, (2002).
34. Experimental Investigation of the Initial Conditions in Turbulent Boundary Layer at High Reynolds Number. 40th Aerospace Sciences Meeting & Exhibit, AIAA-2001-2913, Reno, Nevada, January, (2002).
35. The Effect of the Initial Conditions on Turbulent Boundary Layers. 31st AIAA Fluid Dynamics Conference, AIAA 2001-2913, Anaheim, CA, June, (2001).
36. Turbulent Boundary Layers at Very High Reynolds Number and Its Relation to the Initial Conditions. 31st Fluid Dynamics Conference, AIAA 2001-2913, Anaheim, CA, June, (2001).
37. Characterizing Turbulent Boundary Layers Subject to Strong Adverse Pressure Gradient with Eventual Separation. 2001 ASME Fluids Engineering Division Summer Meeting in New Orleans, Separated and Complex Flows, S-315 FEDSM2001-18112, (2001).
38. Designing a ZPG Experiment Using the George/Castillo Theory. 1000 Island Fluids Mechanics Conference, **Canada**, (2000).

39. LDA Measurements in a Low to Moderate Reynolds number Flat Plate Turbulent Boundary Layer Experiment. American Physical Society-Division of Fluids Dynamics, Washington, D.C November 18-22, (2000).
40. The Effect of the Upstream Conditions on the Deficit of Turbulent Boundary Layers. 34th Aerospace Sciences Meeting & Exhibit, Denver, Colorado June 19-22, (2000).
41. Effect of Upstream Conditions on the Velocity Deficit Profile of Turbulent Boundary Layers. American Physical Society, Division of Fluid Dynamics, New Orleans, Louisiana, November 20-23, (1999).

Contributed Papers and Lectures on Diversity

1. Panel & Session Chair: Voices from the Fields. GEM Consortium, San Juan, PR (2013).
2. Panel: Voices from the Fields. Society of Professional Engineers. Dallas, TX (2012).
3. Undergraduate Research Experience:ÒA MUSTÓ. College of Arts & Science, San Juan, PR (2012).
4. GK-12: Building Bridges From High School to Grad School Through Discovery-based Activities in Energy and the Environment. University of Puerto Rico-Mayaguez, Department of Mechanical Engineering, Mayaguez, P.R., March 4, (2010).
5. Why You Should Go to Graduate School? Universidad del Turabo Gurabo, P.R., March 4, (2010).
6. The Role of Multi Institutional Collaboration in Graduate Education. 9th *International Conference on Engineering Education*, Session T1K-20, July 23 28, San Juan, PR, (2006).
7. Institutional Transformation: Developing Inter-organizational Partnerships for Increasing Diversity and Building Community. WEAPON Conference, PA, (2006).
8. New Trends in Engineering Education: The AGEP CNY-PR. 6th *International Conference on Information Technology Based Higher Education and Training*, Dominican Republic, July 7-9, (2005).
9. Benefits of a Graduate International Experience. 6th *International Conference on Information Technology Based Higher Education and Training*, Dominican Republic, July 7-9, (2005).
10. Success is an Inside Job. AGEP Mentors Meeting, San Juan, PR. June (2004).
11. Training A New Breed of Ph.D. Students: NSF- IGERT. University of Puerto Rico, March, (2004).
12. How to Succeed in Graduate School and Beyond? AGEP Mentor Meeting, Puerto Rico, June (2004).

XII. Review of Manuscripts, Books, Abstracts & Research Proposals

Reviews of Manuscripts: 1999- 2018

- * Journal of Fluid Mechanics
- * Experiment in Fluids
- * AIAA Journal
- * Journal of Turbulence
- * Journal of Fluids Engineering
- * Physics of Fluids
- * International Journal of Heat and Fluid Flow

Reviews of Abstracts & Books

- * AIAA Aerospace Sciences Meetings
- * Introduction to Thermal & Fluids Engineering, Oxford University Press, New York June 2005, February 2006.

Review of Research Proposals: National Science Foundation: 2001-present

- * CBET
- * HRD
- * DGE

NASA and Ford Foundation: Panel Reviews

- * 2013, 2015 Ford Foundation (review for fellowship proposals).
- * 2004, 2008 NASA (review for fellowship proposals).

City College of New York

- * 2005 July- review a proposal for Engineering School
- * 2004 July- review a research proposal for Dean Smaller

XIII. Service & Leadership- Rensselaer Polytechnic Institute

A. Service to University

1. Service & Leadership to the Department:

1. Meet with Prospective Graduate Students, Spring 2010, Spring 2011.
2. The 100 Years Anniversary Committee: Website Upgrade for MANE, 2009.
3. Organized the GK-12 Teachers Science & Technology Camp in Energy and Aerodynamics, July 13-24, 2009.
4. MANE Open House, Fall 2008.
5. Mentored 2 junior professors from MANE, 2007-2009.
6. Medalist Event: Represent Mechanical, Aerospace, and Nuclear Engineering, 2001 Marshall at Graduation Ceremony, 2007.
7. Created the First NSF Graduate Student Seminar at RPI, 2005.
8. Search Committee for Department Chair, 2005.
9. Freshman Orientation for Class of 2004 and 2008.
10. Information Secession with Parents and Incoming Students, 2001- 2003.
11. Freshman Orientation, 2000.
12. Organizing Committee for Black Family Awareness and Lab Tour of Aero Lab, 2001.

13. Recruited and Mentored 17 minority/female graduate students for the MANE department, 1999-2009.

2. Service & Leadership to the SOE

1. Search Committee for SOE Dean at RPI, 2008-2009.
2. Established new collaborations between Venezuela, Puerto Rico & RPI, 2006.

3. Service & Leadership to Rensselaer

1. Marshal at Graduation Ceremony, 2008- 2009.
2. Marshal for Honors Convocation, 2006-2009.
3. Graduate Education Committee at RPI, 2007-2009.
4. Marshal for the Honor Convocations, 2000-2004.
5. Recruited 5 graduate students (1) Ms. (4) PhD, 2003.
6. Organizing Committee for Graduate School Weekend with Admission Office (Mr. George Robbins), 2001.
7. Visited the RPI Alumni Chapter & University of Simon Bolivar, Caracas, Venezuela, 2006.
8. Minority Students Recruitment: NSBE National Conference North Carolina, 2000
9. Organizing Committee for Graduate School Weekend with Admission Office (Mr. George Robbins), 2001.

B. Undergraduate Student Advising and Counseling

1. 2008- present Faculty Advisor for Class of 2012.
2. Faculty Advisor for the Society of Hispanics Professional Engineers at Rensselaer (2000-2004).
3. Faculty Advisor for the American Institute of Aeronautics and Astronautics (student chapter), (2000-2002).
4. 95 Students (2000- 2006).

C. Undergraduate Research Advising:

1. Clarice Nelson, 2017- present. Vertical Axis Wind Turbines.
2. David E Lynch, 2017- present. Portable Microgrid System.
3. David Weldon, 2017 - present. Cilia Like Micro-surface on Wind Energy.
4. Maulin Shah, 2017- present. Vertical Axis Wind Energy Farm.
5. Patrick Russo- 2011: POD & LSE Tools for Noise Generation in Turbulent Boundary Layers.
6. Jason Li- 2011: Wind Tunnel Measurements of Wind Turbines Subject to Geometric Modifications.
7. Christian Baressi- 2011: Multiscale Analysis of Transonic Turbulent Boundary Layers Subject to External Pressure Variation.
8. Kate Unverzart- Summer 2010: Atmospheric Turbulent Boundary Layer in Wind Farms.
9. Francis Lam- 2010: Issues on Renewable Energy.

10. Gustavo Rivera- 2007, 2008, 2009 URP: On Wind Energy Challenges for the Caribbean.
11. Hector Morales- 2009, URP: Turbulent Flows Subject to HFT (now PhD student at Johns Hopkins).
12. Kayle Gosh- 2008 URP: Computational Methods on Turbulent Boundary Layers.
13. Hector Morales- 2008 URP: High Speed Flows in Re-entry Applications.
14. Jared Delahanty- 2007 URP: Design of Hybrid-Wind Turbine System.
15. Marguerite Harrington- 2007 URP: Solar Energy Application in Wind Tunnel Facility.
16. Kerwin Low- 2006 RPI URP: Water Tunnel Facility and Flow Viz (now PhD student at Syracuse University).
17. Joe Richey- 2005 RPI URP: Data Analysis on Forced Convection.
18. Miguel Salgado- 2005 URP: Water Tunnel Studies/Bio-engineering. Co-Advisor: M. Amitay (Student from Puerto Rico).
19. Donald Chao- 2004, RPI, AGEP and URP: Adverse Pressure Gradient Turbulent Boundary Layers (international Experience in Australia).
20. Jenny Castillo- 2003 RPI URP: Compressible Boundary Layers.
21. Brian Brzek- 2002 URP: Rough Adverse Pressure Gradient Flows
22. Raul Cal- 2000, 2001 URP: High Reynolds Number Measurements in ZPG flows (international Experience in Canada).
23. Steven Cruz- RPI- URP: Design Traverse System. Co-Advisor: M. Amitay.

D. Graduate Student Advising and Counseling:

1. 2000 - 2010: 60 Graduate Students.
2. 2000 - 2010: Mentor more than 50 minority/female graduate students.

E. Community and Public Service:

1. Advisory Board at Johns Hopkins University, 2009-present.
NSF-IGERT on Multiscale Systems.
2. Technical Judge, April 9, 2010.
Symposium on Graduate Education at Syracuse University, Syracuse New York.
3. Technical Judge, Fall 2007.
Symposium on Graduate Education, SUAGM, San Juan PR.
4. Technical Judge Tech Conference, Miami Beach Florida, sponsor by NASA, 2000.
5. Closing Ceremony for Hispanics Unidos-Capital District, Albany, NY 2001.

XIV. Sabbatical Leaves, Off-Campus Study Programs and Foreign Professional Travel

Sabbatical Leaves

1. The Johns Hopkins University, MD, Spring - Summer 2008.
Collaborator, Prof. Charles Meneveau.
2. Universidad del Turabo, PR, Spring - Summer 2008.
Collaborator, Prof. Gerardo Carbajal.
3. Universidad de Puerto Rico- Mayaguez, PR, Spring 2003.
Collaborator, Prof. Jorge Gonzalez.

Off-Campus Study Programs

1. Faculty Led Program: MANE 2060 Fundamentals of Flight, PR, Spring 2010.
Universidad del Turabo, Gurabo, **Puerto Rico**.
2. Dual Master Program between RPI and Chalmers University of Technology, Fall 1999 - Fall 2008.
Chalmers University, **Sweden**.
3. International Undergraduate Research Experience for RPI Students: Wind Tunnel Measurements in Adverse Pressure Gradient, Summer 2004.
Victoria University, **Australia**.
4. Intermediate Fluid Dynamics, Spring 2003.
Department of Mechanical Engineering, University of Puerto Rico-Mayaguez, **Puerto Rico**.
5. Danish Center for Applied Mathematics and Mechanics: Experimental Fluid Dynamics and Data Interpretation, Denmark, 2000.
Danish Technology University (DTU), **Denmark**.

XV. Leadership and Partnerships:

A. International: During Career at RPI

- * **Co-organizer for the iTi Conference on Turbulence IV & Workshop on The Impact of Turbulence on Wind Energy Converters**, Bertinoro, Italy, September 19- 23, 2010.
- * **Chairman of the International Symposium on Renewable Energy and Aerospace/Turbulence**: The International Symposium hosted world-class experts from France, Italy, Sweden, USA and Canada. The strong participation of local underrepresented students/scientists and members of NSF, DOE (Sandia National Lab, Brookhaven), ONR, and ASFOR, as well as major research institutions in USA, included: The Johns Hopkins University, University of Minnesota, Cornell University, Rensselaer Polytechnic Institute, Syracuse University, Polytechnic University of New York, and Princeton University among others.
Over 200 STEM students/faculty/engineers attended this event. A positive outcome of this event was the creation of the Aerospace Cluster in Puerto Rico.

- * **Chairman of the The World Alliance on Turbulence and Wind Energy:** This was a workshop funded by NSF to address the following major objectives: (i) To promote international collaborations between the United States, Europe and Australia; (ii) To identify major pressing questions on turbulence and wind energy; (iii) Promote technology transfer by means of collaborations with industry and via creation of an Incubator in Puerto Rico on Renewable Energy (iv) To demonstrate the connection between fundamental knowledge with applications in wind energy; (v) To promote graduate studies for underrepresented students in the area of wind energy and turbulence; and (vi) To establish the *First World Wall-Turbulence Meeting* with the purpose of building an international collaboration to address key questions in turbulence and wind energy.

The key participants of the symposium included: (i) Academia: Danish Technical University & Riso (Denmark), Oldenburg University (Germany), University of Western Ontario (Canada), Cornell University, Johns Hopkins University, Rensselaer Polytechnic Institute, Syracuse University, University of Minnesota, Universidad del Turabo, Penn State, Portland State University, Indiana University, University of Puerto Rico-Mayaguez; (ii) Industry: Pattern Energy, Windmar; (iii) Research Centers and National Labs: Center for Future Energy Systems (RPI), Sandia National Lab., National Renewable Energy Laboratory, Los Alamos National Lab; (iv) Federal Funding Agencies: National Science Foundation (NSF), Office of Naval Research (ONR), Department of Defense (DOD), Department of Energy (DOE); (v) Local Government: PRIDCO, Trust for Science & Technology & Research.

B. National: During Career at RPI

- * **Lead a Major Research Initiative at Rensselaer on Wind Energy to Build Collaborations between Academia & Industry, (2010).**
- * **Led Major Efforts and Partnerships on Diversity at RPI (NSF-AGEP Program):** Co-director, Founder and Co-PI (HRD 0202171). The Alliance for Graduate Education and the Professoriate, under the name of NSF-AGEP: Central New York-Puerto Rico sought to increase the number of underrepresented students in academia. As a junior faculty Castillo put together the team and leadership for this alliance. Such partnership from this project led to new projects (including the LSAMP, Visiting Scholar Program, IGERT, GK-12) and research collaborations within the alliance. The NSF-AGEP CNY-PR project, is a partnership among Universidad del Turabo (UT), Johns Hopkins University, Rensselaer Polytechnic Institute (RPI), Cornell University, University of Puerto Rico-Mayaguez (UPRM) and Syracuse University as the lead institution. The program has demonstrated great success in recruiting students and mentoring minority and female graduate students since its inception in 2002. Some of the outcomes include: more than 25 minority students graduated with the PhD programs, 6 PhD graduates placed in academia including at Georgia

Tech, University of Central Florida, Montana State University, Portland State University, Universidad del Turabo and University of Puerto Rico-Mayaguez. The mentoring of minority faculty resulted in two NSF-Careers awards, three NSF fellowships among others.

- * **Deans and Directors Meeting:** Castillo also organized *The First Deans and Directors Meeting* in Puerto Rico (Feb. 2003). During this meeting, deans and directors of the different engineering and science schools of Puerto Rico, discussed important issues concerning research and education. The purpose of this meeting was to have the opportunity to brainstorm on important issues and to find common areas where these institutions could collaborate in both research and education. The participants and speakers in this event included: Dean Baeslack (RPI), Vice-Provost Tom Apple (RPI), Dean Vaquez (UPRM), Vice-Chancellor Johnson (Syracuse), Prof. Glauser (Center Director Syracuse), Prof. Valero (Cornell), Prof. Carlos Gonzalez (Dean at Polytechnic University of Puerto Rico), Prof. Gonzalez (Department Chair of Mechanical Engineering at UPRM), Prof. Perichi (Department Chair of Mathematics, UPR). A second meeting was led and organized by Castillo (April 2007) between RPI, UPRM, UT, JHU and Cornell concerning outreach activities, transformation within the alliance and future of the program.
- * **Recruitment Events and Graduate School Visit:** Organized/Coordinated by Castillo. During this event representatives from Syracuse, Rensselaer, Cornell and UPRM gave presentations about their programs and research options for students. Following this event, 12 students from UPRM were invited to spend a weekend at Rensselaer as a way to expose them to faculty, research labs and the city. The major outcome of this event was that one PhD student was admitted and enrolled to RPI during the spring of 2004, and four students started their graduate studies in the fall of 2004; including a female Hispanic student. Castillo also visited several Universities in Puerto Rico, and from such activities (workshops on graduate education) 5 MS/PhD graduate students (3 female, 2 Hispanic male) were recruited in 2005. Between 2005 to 2010 Castillo recruited more than 10 graduate students and organized various recruitment events at the Universidad del Turabo.
- * **Mentoring Event:** This event was hosted by UPRM and held during January of 2004, later it was held at Syracuse University, Cornell University and Brookhaven National Laboratory. More than 20 minority students were from Rensselaer and several faculty mentors participated in this mentoring event. Students gave oral presentations about what they would like to see from a mentor. Furthermore, students presented posters of their current investigations. This annual event has been very successful in training PhDs students for careers in academia including mentoring of minority junior faculty. Specific activities related to proposal writing, negotiation start up package, paper publications, how to become a better mentors and how to succeed in academia were some of the topics covered under this annual event.

- * **Chairman of the First Graduate School Fair:** On February 21, 2003 the Graduate School Fair was held at the Mayaguez Resort and Casino with a participation of over 160 graduate and undergraduate students from universities throughout Puerto Rico. The program consisted of educational and motivational talks by invited speakers within and outside the Alliance members, a keynote speech, informational talks by Alliance members about opportunities for graduate school, and a poster session.
- * **Created the Minority Summer Faculty Program at RPI:** The main goal under this program was to develop and increase the research activities of the faculty at UPRM and to enhance the collaboration between UPRM/RPI and the alliance by inviting faculty from UPRM to work during the summer at RPI. Moreover, the success of this summer program was such that in the summer of 2004 and 2005 Castillo found more resources to pay the living expenses, travel and stipend for four faculty from UPRM to work at Rensselaer.
- * **Workshops & Seminars:** A yearly workshop on proposal writing organized by Castillo at UPRM led to two new NSF-Career Awards at UPRM. This is just one example of the impact that this program had made on increasing the number of minority faculty succeeding in academia. Created & Organized with Sheilla Torres the NSF AGEP/IGERT Graduate Student Seminar at RPI, 2006. This event led to 4 NSF Fellowships, 1 Ford Foundation Pre-doctoral Fellowship, 1 Post-doctoral Ford Foundation among other fellowships from industry.
- * **Mentoring & Advising of Student Club:** Society of Hispanic Professional Engineers (SHPE). Mentored more than 200 Hispanic students (SHPE) from 2000- 2004. The chapter won *The Best Chapter Award* at the national level during Castillo's mentorship. Also, raised \$16K (Xerox) for student chapter SHPE and \$6K for scholarships (2002).
- * **MOU between Rensselaer and Universidad del Turabo in Puerto Rico:** Led a Memorandum of Understanding with the purpose to offer students & faculty members from RPI and Universidad del Turabo exchange opportunities related to education and research. Also led a major development of a wind energy facility at UT with the purpose to enable unique opportunities for students to engage on projects related to wind energy and turbulence while working on multi-cultural research teams. The goal was to enable US students to spend a full semester working in Puerto Rico.

C. Leadership Positions at Professional Societies:

- * **Co-organizer of the Texas Fluid Dynamics Conference.** Lake Buchanan, Texas (2014).
- * **Chairman of Symposium on Fluid Dynamics: AI Legacy.** San Juan, Puerto Rico, November 1-3, (2013).
- * Co-founder of the Texas Fluid Dynamics Conference, Lake Buchanan, Texas (2013).

- * **Organized of a Special Session on Fluid Dynamics and Wind Energy, American Institute of Aeronautics and Astronautics.** Key players on wind energy from industry, national labs (USA & Europe) and academia (USA & Europe), Hawaii, (2011).
- * **Leading a Discussion Working Group on Wind Energy and Turbulence at the Fluid Dynamic Technical Committee of the American Institute of Aeronautics and Astronautics,** (2010 - 2013).
- * Co-organized the 5th Mentors meeting at the Brookhaven Laboratory. NSF-AGEP: RPI, UPRM, UT, JHU and Cornell. August, (2008).
- * **Chairman of International Symposium on Renewable Energy and Aerospace/Turbulence.** May 31- June 1, Caguas, Puerto Rico, (2007).
- * Co-organized the 4th Mentors meeting at Syracuse University, October, (2007).
- * Organized workshop on proposal writing in Puerto Rico for Minority Faculty, (2006).
- * Organized Graduate School Workshop at University of Turabo, PR, (2006).
- * Co-organized the 3rd Mentors Meeting at Cornell University, (2006).
- * Organized an NSF workshop on Proposal Writing and Mentoring, at the University of Puerto Rico Mayaguez for graduate students and faculty during June 2- 3, (2005).
- * Treasurer for the NENY-American Institute of Aeronautics and Astronautics (AIAA), (2000-2002).
- * Chairman of the First Graduate School Symposium of the NSF-AGEP CNY-PR, Mayaguez, PR, (2003).
- * Organized a workshop for Minority Graduate Students on funding opportunities at NASA, and how they can improve their communications, (2005).
- * Organized a workshop on Graduate Education at 6th International Conference on Information Technology and Education, Dominican Republic, July, 7-9, (2005).
- * Organized Special Session on Turbulent Boundary Layers I and II. 38th AIAA Fluid Dynamics Conference, Seattle, (2008).
- * Organized Special Session on Turbulent Boundary Layers I and II. 4th AIAA Theoretical Fluid Mechanics, Toronto, (2005).
- * Organizing Committee American Physical Society-Division of Fluids Dynamics, APS Meeting held in New Jersey, (2003).

D. Session Chair at Professional Conferences:

- * Session Chair: APS-Division of Fluid Dynamics, Pittsburgh, Pennsylvania, November 24- 26, 2013.
- * Session Chair: International Conference and Exhibition on Mechanical & Aerospace Engineering, San Antonio, TX. September 30 - October 2, 2013.

- * Session Chair: APS-Division of Fluid Dynamics, San Diego, November 18- 2, 2012.
- * Session Chair: AIAA, Dallas, Knoxville, Orlando, 2013, 2012, 2011.
- * Session Chair: iTi Conference on Turbulence IV, Bertinoro, Italy, September 19- 23, 2010.
- * Session Chair: 1000 Island Fluids Meeting, Canada, 2009, 2010.
- * Session Chair: American Physical Society- Division of Fluid Dynamics, Minnesota, 2009.
- * Session Chair: 46th Aerospace Sciences Meeting & Exhibit, 2008.
- * Session Chair: The 38th AIAA Fluid Dynamics Conference, Seattle, 2008.
- * Session Chair: The 4th AIAA Theoretical Fluid Mechanics, Toronto, 2005.
- * Session Chair: ASME Fluids Meeting, Houston, Texas, 2005.
- * Session Chair: The 6th International Conference on Information Technology and Education, Dominican Republic, July, 7-9, 2005.
- * Session Chair: American Physical Society, Meeting, NJ, 2003.
- * Session Chair: American Society of Physical Society (APS) Meeting 2003, 2001.
- * Session Chair: ASME Conference, 2002.

E. Technical Committee at Professional Societies

- * American Institute of Aeronautics and Astronautics (AIAA), Fluids Dynamic Technical Committee Member, 2010- present.
- * Fluids Dynamic Technical Committee Member, the American Society for Mechanical Engineers (ASME), 2003- 2005.

F. Membership in Professional Organizations

- * Fellow- American Society of Mechanical Engineer (ASME), 2013.
- * Senior Member (Life Time Member) - American Institute of Aeronautics and Astronautics (AIAA), 1999- present.
- * Member - American Physical Society (APS-DFD), 1997- present.
- * Member- The American Association for the Advancement of Science (AAAS), 2013-present.
- * Member of the Aerospace Cluster of Puerto Rico, 2007- 2012.
- * Member of Sigma Xi, 2001- 2004.
- * Member - The American Society for Engineering Education (ASEE), 2003- 2014.

G. Faculty Mentoring and Outreach Activities: During Career at Texas Tech University

- * **Faculty:** During 2011-2012, Castillo worked and mentored several junior faculty within the WCOE including female faculty. In addition, he was instrumental in hiring two new professors (Prof. Carsten Westeegard and Jian Sheng) and a NAE (Prof. Fazle Hussain) in the WCOE. He also wrote several grants with junior and senior faculty in the WCOE.
- * **Female Faculty:** Castillo met with several female faculty in the WCOE to develop strategies to increase the number of female faculty and create a culture for minorities and female faculty to succeed. This led to a major proposal to NSF, partnerships with Puerto Rico (Universidad del Sagrado Corazon, Universidad del Turabo, and University of Puerto Rico-Mayaguez) and a major workshop on diversity (describe below).
- * **Diversity Workshop:** During September 20-21, 2012, Castillo hosted a 2-day seminar *Building Partnerships to Increase Female Minority Students in STEM and Training the Integrated Scholar for the 21st Century*; the proposal was submitted October, 2012. The event was attended by officials from University of Sagrado Corazon, Portland State University, and Texas Tech University (see attached agenda of event with list of participants).
- * **The Cash Family Distinguished Lecture in Engineering.** The first lecture was delivered by Prof. Fazle Hussain, the Hugh and Lillie Cullen Distinguished University Chair and director of the Institute of Fluid Dynamics and Turbulence at the University of Houston. He is a member of the National Academy of Engineering, and winner of a dozen prestigious award worldwide. The major outcome of that event was that we were able to hire him in the WCOE as a Presidential Distinguished Professor.

H. Partnerships: During Career at Texas Tech University

- * During the summer of 2012, Castillo made several visits to meet with institutions in Puerto Rico (e.g., University of Sagrado Corazon, University of Puerto Rico-Mayaguez, and University of Turabo). These collaborative activities are expected to yield about 30 minority students per year.
- * We had several visitors from Mexico (Prof. Hector Morales), Korea (Prof. Hee Chang Lim), Denmark (Prof. Jakob Mann), and Sweden (Prof. Gunnar Johansson).

I. Leadership Activities: During Career at Texas Tech University

- * **NSF Workshop to Build Industrial Partnerships:** In May 21, 2012, Prof. Castillo hosted an Industry Consortium Planning Meeting that was attended by 12 industry, academia, economic development and small business development professionals where Dr. Karlene Hoo of the National Science Foundation was the guest speaker. The seminar focused on the

funding opportunities available through the National Science Foundation, in particular the (1) Innovation programs of the IIP Partnerships for Innovation: Building Innovation Capacity, and Partnerships for Innovation: Accelerating Innovation Research, Innovation-Corps, Industrial/University Cooperative Research Centers; and (2) Small business programs (SBIR) and capacity building to utilize these funding sources to commercialize research and leverage expertise.

- * **International Wind Energy Symposium:** Last fiscal year, Prof. Castillo was instrumental in bringing researchers from around the world (Denmark, Germany, Belgium, Spain) as well as experts from DOE (including the program manager for all Wind Energy programs in USA) and National Labs (e.g., Sandia National Lab, NREL, NCAR) to Texas Tech University. The Symposium *Wind Farm Underperformance and Partnerships*, was held during March 28-30, 2012. The Symposium was attended by approximately 205 people from around the world. Attendees included academia, industry, and students.

- * **State Wind Energy Meeting:** Under the leadership of Prof. Castillo a major meeting was held the Dallas Fort Worth with all major institutions in the State of Texas with the purpose to promote collaborations on wind energy. A major outcome of this event was that we established the first Texas Fluid Dynamics Conference.

- * **Co-organizer of the iTi Conference on Turbulence IV, Italy.** In collaboration with world-class scientists from Italy and Germany, Prof Castillo was part of the organizing committee of the iTi Conference, The major outcome was that the team co-edited a book of the conference proceedings.