



Luciano Castillo, PhD

Don-Kay-Clay Cash Distinguished Engineering Chair
Texas Tech University

I. DEPARTMENT: Mechanical Engineering

Rank: Endowed Chair Professor (Tenured).

School: Engineering

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mobile (518)-573-6245 E-mail: luciano.castillo@ttu.edu

Personal: U.S. Citizen, married, 3 children. Fluent in English and Spanish.

EDUCATION

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

- Thesis: *Similarity Analysis of Turbulent Boundary Layers*.
- Advisor: William K. George
The William R. Kenan Jr. Professor of Distinguished Teaching,
Princeton University

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

II.A. PROFESSIONAL EXPERIENCE

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

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).

II.B. RELEVANT LEADERSHIP EXPERIENCE¹

- **Center Director/President and Endowed Chair**

1. 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.
2. Established Marketing Plan and Strategic Hires for Center. Including NAE faculty, endowed chairs, junior faculty, and scientists from industry.
3. 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.
4. 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.
5. Budgets: Handle more than 7 accounts with complex budget over \$4.5M in funding.

¹ Further details of other leadership activities and roles are found in sections XI-XII, and XIV.

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 out come 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.
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.

- **Leadership on Diversity**

1. 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.

2. 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, and Medicine began on June 5. 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. 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.

3. K-12 Teachers Research Experience. 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.
4. 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.
5. 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.
6. 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).

- **Scholarship Leadership: Editor of Journals**

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

- **Scholarship Leadership: Editor of Conference Proceedings**

Book: NWRC Summer Research Proceedings in Renewable Energy & Medicine. Editors: L. Castillo, S. Pol, B. Atsak and A. Ruiz-Columbie, to be published in (2014).

Book: 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, Berlin Heidelberg, (2012).

Abstracts: Editors; Oberlak, M., Peinke, J., Talamelli, A. and Castillo, L. *iTi Conference on Turbulence IV²*, Bertinoro, Italy, September 19- 23, 2010.

Abstracts: Symposium on Fluid Dynamics- A Legacy. Editor: L. Castillo. National Wind Resource Center, (2014).

III. HONORS AND DISTINCTIONS

- **Awards**

Fellow 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).

- **Honors**

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

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

²Includes a workshop on wind energy & turbulence.

Invited Presentation: 1st International Symposium on Energy Challenges & Mechanics. Scotland, UK, July 8-10, (2014).

Invited Paper: 37th AIAA Fluid Dynamics Conference & Exhibit, Miami, FL. (2007).

Invited Paper: 36th AIAA Fluid Dynamics Conference & Exhibit, San Francisco, CA (2006).

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

- **Key Search Committees: Selected by Upper Administration at RPI**

Dean of the College of Engineering, 2008-2009.

Vice President for Research, 2007.

Vice-Provost for Diversity, 2003.

- **Keynote Speeches & Distinguished Lecture on Wind Energy**

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

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

- **Keynote Speeches on Diversity**

- *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).

IV. INTELLECTUAL PROPERTY & ENTREPRENEURSHIP

- **Invention Disclosures:**

1. Smart Universal Medical Card- Invention Disclosure, Rensselaer Polytechnic Institute, Troy, N.Y., (2011).
2. Speed Bump Energy Harvesting System- Invention Disclosure, Universidad del Turabo, Gurabo, Puerto Rico, (2011).
3. Bio-inspired Surface for Drag Reduction- Invention Disclosure, Issued 2012 at Texas Tech University, Lubbock, Texas, (2012).
4. Micro-Turbines for Home Garden- Invention Disclosure, Issued 2013 at Texas Tech University, Lubbock, Texas, (2012).
5. Technology Development for Reducing Response Time at ER Centers. Invention Disclosure, Issued 2014 at Texas Tech University. Authors: Luciano Castillo, Namrata Tapase, and Suhas Pol.
6. Biometrics Displaying and Navigation Enabled Swimming Goggles. Invention Disclosure, Issued 2014 at Texas Tech University. Authors: Luciano Castillo and Martin Fajardo

- **Patent Submitted:**

1. Bio-inspired Surface for Drag Reduction Applications-D-0911, B. Aksak and L. Castillo, (2013).

- **Consulting:**

1. **Recycle Reclamation Services, LCC in Pennsylvania (2008)**.
Developed a feasibility study and the resulting business plan.
2. **University of Puerto Rico Mayaguez (2003-2007)**.
Development of research projects & strategies for graduate programs, diversity strategies and mentoring of junior faculty.
3. **Universidad del Turabo (2007-2010)**.
Development of Master Program in Renewable Energy & Aerospace. Key role on Phase II of the PREC (Incubator on Renewable Energy).

- **Business Development:**

1. **Imports & Distribution: (1981-1984)**.
Radios from New York to Puerto Rico for automobiles under the Universal Tire Center company.
2. **Imports & distribution: (1981- 1987)**.
Fancy wheels from California to Puerto Rico where we had exclusive lines to distribute the American Racing & American Eagle wheels in Puerto Rico.

V. RESEARCH GRANTS & CONTRACTS

A. Proposals Approved & Funded:

1. National Science Foundation (NSF-CBET). **Symposium: Symposium on Frontiers of Fluid Dynamics-A Legacy**. PI: Castillo, L., Co-PI: G. Araya. Duration: 2013- 2014. Total Amount: \$15,000.

2. 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.
3. 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.
4. National Science Foundation (NSF-CBET). **Workshop: On Wind Farm Underperformance- An Industrial Perspective.** PI: Castillo, L., Duration: 2011- 2012. Total Amount: \$20,000.
5. 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.
6. 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.
7. 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.
8. 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.
9. 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.
10. 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.
11. 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.
12. 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.

13. TeraGrid. **Thermal Boundary Layer Simulations under Adverse Pressure Gradient.** PI: Castillo, L.; Co-PI: Jansen, K., Duration: 2006- 2007. Computational Allocation: 30,000 Us.
14. 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.
15. 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.
16. Office of Naval Research (ONR). **Investigation of Adverse Pressure Gradient.** PI: Castillo, L., Duration: 2006- 2007. Total Amount: \$70,000.
17. 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.
18. 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.
19. New York State Science and Technology Academic Research (NYSTAR). *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.
20. The National Aeronautics and Space Administration (NASA) - Stennis Space Center³. **Flow Induced Vibration.** PI: Castillo, L., Duration: 2002- 2003. Total Amount: \$66,000.
21. 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 over \$5M with cost-sharing). Co-PI: Castillo, L., Total Amount at RPI \$1,500,000. Duration: 2002- 2007.
22. 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 Submitted & Pending:

1. National Science Foundation (NSF-REU Site). **REU Site: Summer Research Institute on Sustainable Systems** PI: Castillo, L., Co-PI: Pol, S., Duration: 2014- 2017. Total Amount: \$332,221.

³Sub-contract from University of Puerto Rico-Mayaguez, Project PI: Jia, Y.

VI. Student Thesis Supervision

A. Master Thesis (12 Completed, 2 in Progress)

- **Santiago Novoa**, System of Systems Controls for Smart Wind Farms. Co-Advise with Prof. Michael Giesselmann (Electrical Engineering). December 2014.
- **Amelia Taylor**, Experimental Studies in a Scaled Down 3x10 Wind Array. Co-Advise with Prof. Suhas Pol. December 2014.
- **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 at Pratt & Whitney.
- **Jose Lebron-Bosques**, Turbulent Boundary Layers Subject to External Conditions. Master of Science, August 2007. Currently at Pratt & Whitney.
- **Katherine Newhall**, Turbulent Boundary Layers: A Look at Skin Friction, Pressure Gradient, Surface Roughness and The Power Law. Master of Science, August 2006. Currently Post-doctoral Fellow at the Courant Institute of Mathematical Sciences - New York University.
- **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 Assistant Professor at University of Texas-San Antonio.
- **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 Associate Professor, 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: (12 Completed & 4 in Progress)

- **Walter Gutierrez**, Impact of Low Level Jets in Performance of Wind Farms. Co-Advise with Prof. Araya, May 2016.
- **Suranga Dharmarathne**, LES Simulations of Film Cooling in Turbulent Flows Subject to Pressure Gradient. Co-Advise with Prof. Araya, December 2014.
- **Can Liu**, Large-eddy Simulations of a Developing Commercial Scale Wind Array. Co-Advise with Prof. Araya, May 2016.
- **Ali Doosttalab**, The Structure of the Rough Thermal Turbulent Boundary Layer in Wall-bounded Flows. May 2018.
- **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 Post-doctoral Fellow at Texas Tech University.
- **Jie Zhang**, Hybrid and Uncertainty-based Surrogate Modeling with Applications to Wind Energy. Co-Advise with Prof. Achille Messac, (2012). Currently Post-doctoral Fellow at NREL.
- **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 at Pratt & Whitney.
- **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 at Pratt & Whitney.
- **Victor Maldonado**, The Role of Freestream Turbulence and Flow Control on the Aerodynamic Performance of Wind Turbine Blades. August 2012. Currently Assistant Professor at the University of Texas-San Antonio.
- **Souma Chowdhury**, Global Optimization of Onshore & Offshore Wind Farms. Co-advise with A. Messac (Syracuse University), August 2012. Currently Research Assistant Professor at Syracuse University.
- **Guillermo Araya**, Numerical Heat Transfer Analysis in Turbulent Wall Bounded Flows. Doctor of Philosophy, August 2008. Currently Research Assistant Professor (TTU).
- **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 Courant Institute of Mathematical Sciences - New York University.
Assistant Professor.
- **Raul B. Cal**, The Favorable Pressure Gradient Turbulent Boundary Layer. Doctor in Philosophy, May 2006.
Currently Associate Professor, Portland State University.
- **Xia Wang**, Similarity Analysis for Turbulent Boundary Layers Subject to Pressure Gradient and Heat Transfer. Doctor of Philosophy, December 2003.
Currently Associate Professor (tenured), 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.

C. Doctoral Thesis Committee Member:

- Neha Marathe, Effect of Yawed Flow on Wind Turbine Power Production and Wake Deflection, (Advisor- A. Swift, May 2014).
- John C. Vaccaro, Flow Control in a Compact Inlet, (Advisor- M. Amitay, April 2011).
- Ajay Malavia, Decision Technologies and Models for Interdiction and Enforcement Policies of City Level Illegal Drug Supply Chains, (Advisor- T. Sharkey, December 2010).
- Victor Marrero, Non-Newtonian Studies of Patient-based Cardiovascular Models using a Stabilized Finite Element Flow Solver, (Advisor- K. Jansen and J. Tichy, August 2009).
- David Tamburello, Particles in Synthetic Jet, (Advisor- M. Amitay, July 2007).
- Ana Pavlova, Synthetic Jets, (Advisor - M. Amitay, February 2007).
- Geraldo Carbajal, Heat Pipe Heat Transfer, (Advisor - G.P. Peterson, November 2006).
- Andrew Hunter, Turbulent Separated Flow Over a Rounded Trailing Edge, (Advisor - B. Thompson, January 2005).
- Elaine Bohr, Inflow Generation Technique for Large Eddy Simulation of Turbulent Boundary Layers, (Advisor - K. Jansen, May 2005).
- Suh Changwon, Informatics Aided Design of Crystal Chemistry, (Advisor - K. Rajan, Expected December 2004).
- Kang-Ho Shon, Non-Premixed Combustion with Swirl, (Advisor - Z. Rusak, May 2004).

- William Topper, Heat Transfer Enhancement in Gas-Turbine Recuperates, (Advisors - M. Jensen & B. Thompson, December 2003).
- Lamyaa Elgabry, Local Heat Transfer Distribution on Smooth and Roughened Surfaces Under an Array of Angled Impinging Jets, (Advisor - D. Kaminski, August 2003).
- Andres Tejada-Martinez, Dynamic Subgrid-Scale Modeling for Large-Eddy Simulation of Turbulent Flows with a Stabilized Finite Element Method, (Advisor - K. Jansen, December, 2002).
- James Gebbie, Pure Fluid and Binary Mixture Transient of a Heat Pump with a Distillation Column: An Experimental and Numerical Investigation, (Advisor - M. Jensen, December 2002).
- Samir A. Salamah, A Numerical Study of the Heat Transfer Due to An Array of Submerged Jets Impinging on a Moving Surface, (Advisor - D. Kaminski, October 2001).

VII. Post-Doctoral and Visiting Scholars

a. Post Doctoral Research Associates

Dr. Humberto Bocanegra, June 2014- present.

Dr. Guoyi Ke, June 2014- present.

Dr. Victor H. Maldonado, August 2012- 2013.

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.

b. Research Professors

Dr. Guillermo Arraya, August 2011- present, Research Assistant Professor,
Department of Mechanical Engineering, Texas Tech University.

Dr. Suhas Pol, January 2013- present, 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 2014.

Dr. Murat Tutkun, Institute for Energy Technology, Norway, Summer 2014.

Prof. Victor Maldonado, University of Texas-San Antonio. Summer 2014.

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).

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, 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. 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).
2. 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).
3. 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).
4. 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).
5. 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).
6. 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).

7. 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).
8. 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).
9. 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).
10. 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).
11. 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).
12. 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. Proceedings for the 2013 Symposium on Frontiers of Fluid Dynamics, A Legacy. A Tribute to Fazle Hussain. Editor: Castillo, L., *National Wind Resource Center*, ISBN:978-0-9903627-0-8. (2014).
2. 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).
3. *Progress in Turbulence & Wind Energy IV*, *Springer Proceedings in Physics*, (2012).

B. Peer Review Journal Articles

1. 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).
2. The log behavior of the Reynolds shear stress in accelerating turbulent boundary layers. Araya, G. Castillo, L. and Hussain, F., under review at *Journal of Fluid Mechanics*, (2014).
 3. DNS of a Passive Scalar in a Turbulent Channel Flow with Spanwise Sinusoidal Blowing Perturbations. Liu, C., Araya, G., Leonardi, S. and Castillo, L., under review at *Journal of Fluid Mechanics*, (2014).
 4. The Effects of Blade Number in a Scaled Wind Turbine Array. , Newman, J., Cal, R.B. and Castillo, L., under review at the *Journal of Renewable Energy*, (2014).
 5. 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).
 6. Pseudo Spectral Analysis of the Energy Entrainment in a Scaled Down Wind Farm. Newman, J., Drew, D. and Castillo, L., accepted for publication at the *Journal of Renewable Energy*, (2014).
 7. 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.
 8. 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.
 9. The Role of Free Stream Turbulence and Surface Roughness on the Aerodynamic Performance of a Wind Turbine Blade. Maldonado, V., Torres-Nieves, S., Castillo, L., and Meneveau, C., under review at the *Wind Energy*, (2014).
 10. 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).
 11. 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).
 12. A Multivariate and Multimodal Wind Distribution Model. Zhang, J., Chowdhury, S., Messac, A. and Castillo, L., *Renewable Energy*, **51**, 436-447, (2013).
 13. 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).
 14. DNS of Turbulent Thermal Boundary Layers Subjected to Adverse Streamwise Pressure Gradients. Araya, G. and Castillo, L., *Physics of Fluids*, **25**, 095107, (2013) .

15. 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).
16. 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).
17. 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). Cited 51 times, according to Google Scholar.
18. Experimental Study of the Kinetic Energy Budget in a Wind Turbine Streamtube. Lebron, J., Castillo, L. and Meneveau, C., *Journal of Turbulence*, **vol.** 13, DOI:10.1080/14685248.2012.705005, (2012).
19. 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).
20. A Response Surface-based Cost Model for Wind Farm Design. J. Zhang, S. Chowdhury, A. Messac, and L. Castillo. *Energy Policy*, **42**:538550, (2012).
21. 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).
22. 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).
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24. 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).
25. 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). (15 pages)
26. 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). (33 pages).
27. Effect of Freestream Turbulence on Rough ZPG Turbulent Boundary Layers. Brzek, B, Cal, R.B., Torres-Nieves, S., Lebron-Bosques, J., Meneveau, C. and Castillo, L., *Journal of Fluid Mechanics*, **Vol.** 635, pp. 207-243, (2009). (36 pages).

28. The Rough Favorable Pressure Gradient Turbulent Boundary Layer. Cal., R.B., Brzek, B., Johansson, G. and Castillo, L., *Journal of Fluid Mechanics*, **Vol. 641**, pp. 129-155, (2009). (26 pages).
29. Theoretical Evaluation of the Reynolds Shear Stress and Flow Parameters in Transitionally Rough Turbulent Boundary Layers. Brzek, B., Bailon-Cuba, J., Castillo, L. and Leonardi, S., *Journal of Turbulence*, **Vol. 10**, No. 5, pp. 1-28, DOI: 10.1080/14685240802524392, (2009). (28 pages).
30. Turbulent Channel Flow with 2D Wedges of Random Height on One Wall. Bailon-Cuba, J., Leonardi, S. and Castillo, L., *International Journal of Heat and Fluid Flow*, **Vol. 30**, Issue 5, pp. 1007-1015, (2009). (9 pages).
31. Numerical Assessment of Local Forcing on the Heat Transfer in a Turbulent Channel Flow. Araya, G., Leonardi, S. and Castillo, L. *Physics of Fluids*, **Vol. 20**, No. 8, Article number: 085105, (2008). (22 pages).
32. Influence of External Conditions on Transitionally Rough Favorable Pressure Gradient. Cal, R.B., Johansson, G.T. and Castillo, L., *Journal of Turbulence*, **Vol. 9**. No. 38, pp. 1-22, (2008). (22 pages). Invited Paper.
33. Temperature Scalings and Profiles in Forced Convection Turbulent Boundary Layers. Wang, X., Castillo, L. and Araya, G., *Journal of Heat Transfer*, **Vol. 130**, Issue 2, 021701, (2008). (17 pages).
34. Passive Scalar Statistics in a Turbulent Channel with Local Time-periodic Blowing/Suction. Araya, G., Leonardi, S. and Castillo, L., *Physica D*, **Vol. 237**, Issues 14-17, pp. 2190-2194, (2008). (5 pages).
35. Similarity Analysis of Favorable Pressure Gradient Turbulent Boundary Layer with Eventual Quasilaminarization. Cal., R.B. and Castillo, L., *Physics of Fluids*, **Vol. 20**, Issue 10, Article number: 105106, (2008). (18 pages). Invited Paper.
36. Transitionally Rough Zero Pressure Gradient Turbulent Boundary Layers. Brzek, B. Cal, R.B., Johansson, T.G. and Castillo, L., *Experiments in Fluids*, **Vol. 44**, No. 1, pp. 115-124, (2008). (9 pages). Cited 19 times.
37. Direct Numerical Simulations of Turbulent Channel Flow with Local Forcing at Walls. Araya, G., Leonardi, S., Castillo, L. and Orlandi, L., *International Journal Transport Phenomena*, **Vol. 9**, pp. 297-310, (2007). (14 pages).
38. Inner and Outer Scalings in Rough Surface Zero Pressure Gradient Turbulent Boundary Layers. Brzek, B., Cal, R.B., Johansson, T.G. and Castillo, L., *Physics of Fluids*, **Vol. 19**, No. 6, Article number: 065101, (2007). (17 pages). Cited 29 times.
39. Upstream Condition Effects on Turbulent Boundary Layers Subjected to Favorable Pressure Gradients. Cal, R.B., Johansson, T.G. and Castillo, L., *AIAA Journal*, 0001-1452, **Vol. 44**, No. 11, pp. 2488-2499, (2006). (12 pages).
40. Introduction: Turbulent Boundary Layers. Castillo, L. and Tummin, A., *AIAA Journal*, **Vol. 44**, No. 11, pp. 2434, (2006). (1 page).
41. Similarity Analysis for Transpired Turbulent Boundary Layer Subject to External Pressure Gradients. Cal, R.B. and Castillo, L., *AIAA Journal*, **Vol. 43**, No. 9, pp.1913-1922, (2005). (10 pages).

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43. Smooth and Rough Turbulent Boundary Layers at High Reynolds Number. Castillo, L., Seo, J., Hangan, H. and Johansson, G., *Experiments in Fluids*, ISSN 0723-4864 (Print) 1432-1114 (Online), **Vol. 36**, No. 5, pp. 759-774, (2004). (16 pages). Cited 24 times.
44. Reynolds stress in Turbulent Boundary Layers at High Reynolds Number. Seo, J., Castillo, L., Johansson, G.T. and Hangan, H., *Journal of Turbulence*, **Vol. 5**, No.15, pp. 1-22, (2004). (22 pages).
45. The Gallery of Fluid Motion Special Issue. Eds. Rusak, Z. and Castillo, L., *Physics of Fluids*, **Vol. 16**, (2004). (1 page).
46. Separation Criterion for Turbulent Boundary Layers Via Similarity Analysis. Castillo, L., Wang, X. and George, W. K., *Journal of Fluids Engineering*, **126**, Issue 3, pp. 197-204, (2004). (8 pages). Robert T. Knapp Best Paper Award. Cited 36 times.
47. Similarity Analysis for Non-equilibrium Turbulent Boundary Layers. Castillo, L. and Wang, X., *Journal of Fluid Engineering*, **126**, pp. 827-834, (2004). (8 pages).
48. Outer Flow Scaling of Smooth and Rough Wall Turbulent Boundary Layers. Akinlade, O.G., Bergstrom, D.J., Tachie, M.F. and Castillo, L., *Experiments in Fluids*, **37**, Issue 4, pp. 604-612, (2004). (9 pages).
49. Asymptotic Solutions in Forced Convection Turbulent Boundary Layers. Wang, X. and Castillo, L., *Journal of Turbulence*, **Vol. 4**, No. 6, pp. 1-18, (2003). (18 pages).
50. The Effects of the Upstream Conditions on a Low Reynolds Number Turbulent Boundary Layer with Zero Pressure Gradient. Castillo, L. and Johansson, G.T., *Journal of Turbulence*, **Vol. 3**, No. 31, pp 1-19, DOI: 10.1088/1468-5248/3/1/031, (2002). (19 pages). Cited 41 times.
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53. Similarity Analysis for Turbulent Boundary Layers with Pressure Gradient: The Outer Flow. Castillo, L. and George, W.K., *AIAA Journal*, **39**, No. 1, pp. 41-47 (2001). (7 pages). Cited 88 times.
54. A Theory for Turbulent Pipe and Channel Flows. Wosnik, M., Castillo, L. and George, W.K., *Journal of Fluid Mechanics*, **421**, pp. 115-145, (2000). (30 pages). Cited 117 times.
55. Effects of the Upstream Conditions on the Mean Statistics of Turbulent Boundary Layers with Zero Pressure Gradient. Castillo, L., Johansson, G. and Eisen-

- men, E. *Lecture Notes in Physics*, ISSN 1616-6361, **Vol. 567** pp. 80-91, (2001). (11 pages). Cited 36 times.
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57. Similarity Theory for Forced Convection Thermal Boundary Layer. George W.K., Wosnik, M. and Castillo, L., *Transport Phenomena in Thermal Science and Process Engineering*, **1**, pp. 239-244, (1997). (5 pages).
58. Boundary Layer with Pressure Gradient: Another Look at the Equilibrium Boundary Layer. George, W.K. and Castillo, L., 13th Symposium on Turbulence, Rolla, (Reed X. B. ed.) MO, Sept 21-23, (1992). *Near the Wall Turbulent Flows*, pp. 901-910, (1993). (9 pages). Cited 24 times.

Journal Articles Under Preparation

59. Field Experiments of Scaled Down Wind Farm. Pol, S., Taylor, A., Bilbao, A., Doostalab, A., Novoa, S., Westergaard, C., Hussain, F., Sheng, J., Ren, B., Giesselmann, M., Glauser, M., and Castillo, L., to be submitted at *Journal of Renewable Energy*, (2014).
60. The Role of Roughness in FPG Turbulent Boundary Layers. Torres-Nieves, S.N., Brzek, B, Cal. R.B., Lebron, J., Meneveau, C. and Castillo, L., to be submitted at the *Physics of Fluids*, (2014).
61. DNS Turbulent Boundary Layers with Suction at the Wall. Dharmarathne, S., Araya, G., Leonardi, S., and Castillo, L., to be submitted at the *Physics of Fluids*, (2014).
62. Simulations of Drag Reduction in Turbulent Channel Flow. Carrasquillo, K., Leonardi, S., Hussain, F. and Castillo, L. to be submitted at the *Journal of Fluid Mechanics*, (2014).

C. Refereed Conference Articles

1. Wake Measurements of a Field-installed Model Wind Turbine. Pol, S., Taylor, A., Bilbao, A., Doostalab, A., Novoa, S., Westergaard, C., Hussain, F., Sheng, J., Ren, B., Giesselmann, M., Glauser, M., and Castillo, L., *The Science of Making Torque From Wind*, Lyngby, Denmark, June 18-20, (2014).
2. Toward Understanding Low Level Jet Climatology over the West Texas and their Impact on Wind Energy. Gutierrez, W., Araya, G., Basu, S., Ruiz-Columbie, A., and Castillo, L., *The Science of Making Torque From Wind*, Lyngby, Denmark, June 18-20, (2014).
3. Domain Segmentation Based on Uncertainty in the Surrogate. J. Zhang, S. Chowdhury, and A. Messac. In *53rd AIAA/ASME/ASCE/AHS/ASC Structures, Structural Dynamics and Materials Conference*, Honolulu, Hawaii, April 23-26, (2012).
4. Effect of Free-stream Turbulence on the Flow Around an S809 Wind Turbine Blade. Torres-Nieves, S., Maldonado, V., Kang, H.S., Meneveau, C., and Castillo, L., *50th AIAA Aerospace Sciences*, 9-12 Jan, 2012, Nashville, TN. (2012).
5. Exploring the Best Performing Commercial Wind Turbines for Different Wind Regimes in a Target Market. S. Chowdhury, J. Zhang, M. Catalano, A. Mehmani, A. Messac, and L. Castillo. In *53rd AIAA/ASME/ASCE/AHS/ASC Structures, Structural Dynamics and Materials Conference*, Honolulu, Hawaii, April 23-26 (2012).
6. Hybrid Measure-correlate-predict Method for Wind Resource Assessment. J. Zhang, S. Chowdhury, A. Messac, and L. Castillo. In *ASME 2012 6th International Conference on Energy Sustainability*, San Diego, CA, July 23-26 (2012).
7. On the Similarities of the Engineering and Atmospheric Boundary Layers. Araya G., Castillo L., Ruiz-Columbie A., Schroeder J. and Basu S.. *Proceedings of the 20th Symposium on Boundary Layers and Turbulence*, 9-13 July 2012, Boston, MA, USA (2012).
8. Turbulent Thermal Boundary Layers Simulations in Rough Walls via DNS. Araya G., Chen Y. and Castillo L., *7th International Conference on Computational Fluid Dynamics (ICCFD7)*, Big Island, Hawaii, July 9-13, (2012).
9. Exploring the Cost-Capacity Factor Tradeoffs Offered by the Best Performing Commercial Turbines. Chowdhury, S., Zhang, J., Mehmani, A., Messac, A. and Castillo, L., *14th AIAA/ISSMO Multidisciplinary Analysis and Optimization Conference*, Indianapolis, Indiana, September 17-19, (2012).
10. Characterizing The Influence of Land Area and Nameplate Capacity on The Optimal Wind Farm Performance. Chowdhury, S., Zhang, J., Messac, A. and Castillo, L., *ASME 2012 6th International Conference on Energy Sustainability*, San Diego, CA, July 23-26, (2012).
11. Characterizing the Uncertainty Propagation from Wind Conditions to Optimal Farm Energy Production. Chowdhury, S., Zhang, Jie, Messac, A. and Castillo, L., *52nd AIAA/ASME/ASCE/AHS/ASC Structures, Structural Dynamics and Materials Conference*, Denver, Colorado, April 4-7, (2011).

12. Surrogate Modeling of Complex Systems Using Adaptive Hybrid Functions. J. Zhang, S. Chowdhury, A. Messac, J. Zhang, and L. Castillo. ASME 2011 International Design Engineering Technical Conferences (IDETC), Washington, DC, August 28-31 (2011).
13. A Comprehensive Measure of the Energy Resource Potential of A Wind Farm Site. J. Zhang, S. Chowdhury, A. Messac, and L. Castillo. ASME 2011 5th International Conference on Energy Sustainability, Washington, DC, August 7-10 (2011).
14. DNS of Thermal Turbulent Boundary Layers Subject to External Pressure Gradient. Araya G. and Castillo L., 6th AIAA Theoretical Fluid Mechanics Conference 27 - 30 June, Honolulu, Hawaii, (2011).
15. Multivariate and Multimodal Wind Distribution Model Based on Kernel Density Estimation. J. Zhang, S. Chowdhury, A. Messac, and L. Castillo. In ASME 2011 5th International Conference on Energy Sustainability, Washington, DC, August 7-10 (2011).
16. Developing a Flexible Platform for the Optimal Design of Commercial-scale Wind Farms. S. Chowdhury, J. Zhang, A. Messac, and L. Castillo. In ASME 2011 5th International Conference on Energy Sustainability, Washington, DC, August 7-10, (2011).
17. A New Robust Surrogate Model: Reliability Based Hybrid Functions. J. Zhang, S. Chowdhury, and A. Messac. In 52nd AIAA/ASME/ASCE/AHS/ASC Structures, Structural Dynamics and Materials Conference, Denver, Colorado, April 4-7, (2011).
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2. Abstracts

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 11. Future Experimental Study to Compare the Effects of Two-Bladed and Three-Bladed Model Wind Turbine Designs in an Array. McKeon, D., Sullivan, J., Araya, G., and Castillo, L., *Symposium Wind Farms Underperformance & Partnerships: Building Partnerships to Meet the 2030 Grand Challenge*, March 28 - 29 2012, Lubbock, TX, USA (poster), (2012).

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13. On the similarities of the engineering and atmospheric boundary layers, 20th Symposium on Boundary Layers and Turbulence, Ruiz, A., Araya, G. Schroeder, J. and Castillo, L., 9-13 July 2012, Boston, MA, USA. (2012).
14. Analysis of the Vertical Entrainment of Mean Kinetic Energy in a Scaled Wind Turbine Array. Newman, J., Drew, D., Castillo, L. *APS 65th DFD*, San Diego Convention Center, San Diego CA, November 18-20, abstract, (2012).
15. Comparison of Flow Development in Two-Bladed and Three-Bladed Wind Turbine Arrays: Preliminary Results. McKeon, D., Sullivan, J., Camp, E., Melius M., Dulicia D., Cal, R., and Castillo, L., Conference The Science of Making Torque from Wind, Oldenburg, Germany, poster presentation, (2012).
16. Flow Development Comparison in Two-bladed and Three-bladed Model Wind Turbine Arrays. McKeon, D., Sullivan, J., Camp, E., Melius M., Dulicia D., Cal, R., and Castillo, L., 65th Annual Meeting of the American Physical Society Division of Fluid Dynamics, 2012, San Diego, CA. abstract #R31.00004, (2012).
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19. Large Eddy Simulation of a Film Cooling Technique with a Plenum. Dhar-marathne, S., Sridhar, N., Araya, G., Castillo, L., and Parameswaran, S., 65th Annual Meeting of the American Physical Society Division of Fluid Dynamics, 2012, San Diego, CA. abstract #H23.00009, (2012).
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21. Vertical Mean Kinetic Energy Entrainment in a Scaled Wind Turbine Array. Jensen, N., Drew, D., and Castillo, L., 65th Annual Meeting of the American Physical Society Division of Fluid Dynamics, 2012, San Diego, CA. abstract #G31.00009, (2012).
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24. A Multi-scale Approach for the Thermally Stratified Turbulent Boundary Layer. Notaro, S., Rivera-Rosario, G., and Castillo, L., *APS 64th DFD*, Baltimore Convention Center, Baltimore, MD, November 20- 22, abstract# A7.00006, (2011).
25. 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).
26. High Reynolds numbers of Thermal Turbulent Boundary Layers Subject to External Pressure Gradient. Castillo, L., and Araya, L., *APS 64th DFD*, Baltimore Convention Center, Baltimore, MD, November 20- 22, abstract# M7.00010, (2011).
27. POD Analysis of a ZPG Turbulent Boundary Layer with and without Surface Roughness. Newman, J., Russo, P., Castillo, L., Drew, D., and Adrian, R. *APS 64th DFD*, Baltimore Convention Center, Baltimore, MD, November 20- 22, abstract# A12.0000, (2011).
28. Experimental Study of the Kinetic Energy Budget of a Wind Turbine Streamtube. Lebron, J., Castillo, L., and Meneveau, C., *APS 64th DFD*, Baltimore Convention Center, Baltimore, MD, November 20- 22, abstract# A27.00008, (2011).
29. Effect of Free-stream Turbulence on Flow Separation in S809 Wind Turbine Blade. Torres-Nieves, S., Maldonado, V., Meneveau, C., and Castillo, L., *APS 64th DFD*, Baltimore Convention Center, Baltimore, MD, November 20- 22, abstract# A27.00010, (2011).
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 43. A Dynamic Multi-scale Approach for Turbulent Inflow Generation in Spatially-developing Boundary Layers with Streamwise Pressure Gradient. Araya, G., Castillo, L., Jansen, K. and Meneveau, C., *American Physical Society, 61st Annual Meeting of the APS Division of Fluid Dynamics*, November 23-25, abstract #EB.005. (2008).

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50. Turbulent Channel Flow with Random Roughness on One Wall. Bailon-Cuba, J., Leonardi, S. and Castillo, L., *American Physical Society*, 60th Annual Meeting APS Division of Fluids Dynamics, Salt Lake, Utah, November, abstract #FB.003, (2007).
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52. Numerical Study of Rough and Smooth Turbulent Boundary Layers at Zero Pressure Gradient. Bailon-Cuba, J., Brzek, B., Leonardi, S. and Castillo, L., *American Physical Society*, 59th Annual Meeting APS Division of Fluids Dynamics, Tampa, FL, November, abstract #LL.005, (2006).
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56. Power Law for Rough Favorable Pressure Gradient Turbulent Boundary Layers. Newhall, K. and Castillo, L., *American Physical Society*, 59th Annual Meeting APS Division of Fluids Dynamics, Tampa, FL, November, abstract #AL.007, (2006).
57. Outer Scaling in Rough Surface Turbulent Boundary Layers. Brzek, B., Cal, R., Johansson, G. and Castillo, L., *Tech Valley Engineering Symposium*, Schenectady, NY. April (2005).
58. Prediction of Relaminarization of Favorable Pressure Gradient Turbulent Boundary Layers. Cal. R., Wang, X. and Castillo, L., 58th *American Physical Society-Division of Fluid Dynamics*, Chicago, Illinois, November 20 - 22, abstract #NR.009, (2005).
59. Favorable Pressure Gradient Turbulent Boundary Layers: Part 1. Wall Shear Stress Calculations. Newhall, K., Cal, R., Brzek, B., Johansson, G. and Castillo, L., 58th *American Physical Society- Division of Fluid Dynamics*, Chicago, Illinois, November 20 - 22, abstract #NR.007, (2005).
60. Favorable Pressure Gradient Turbulent Boundary Layers: Part 2. Effects of the Upstream Conditions on the Inner Flow. Castillo, L. and Johansson, G., *American Physical Society- Division of Fluid Dynamics*, Chicago, Illinois, November 20 - 22, abstract #NR.008, (2005).
61. Temperature Scales for Thermal Turbulent Boundary Layers. Wang, X. and Castillo, L., *American Physical Society*, 58th Annual Meeting of the Division of Fluid Dynamics, November 20-22, abstract #BR.001, (2005).
62. An Investigation of the Outer Flow Scaling of Developing Adverse Pressure Gradient Turbulent Boundary Layers: Part 1 Mean Deficit and Reynolds Stresses Behavior. Anderson, C., Brzek, B., Castillo, L. and Turan, O., 57th *American Physical Society- Division of Fluid Dynamics*, Vol. 49, No. 9, Seattle Washington, November 21- 23, abstract # FA.004, (2004).
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64. Another View of Pressure Gradient Turbulent Boundary layers Via Similarity Analysis. Wang, X. and Castillo, L., 57th *American Physical Society- Division of Fluid Dynamics*, Vol 49, No. 9, Seattle, Washington, November 21- 23, abstract #FA.002, (2004).

65. An Investigation of the Outer Flow Scaling of Developing Adverse Pressure Gradient Turbulent Boundary Layers: Part 2. Flow Development and Characterization. Brzek, B., Anderson, C., Castillo, L. and Turan, O., *57th American Physical Society- Division of Fluid Dynamics*, Vol 49, No. 9, Seattle Washington, November 21-23, abstract #FA.005, (2004).
66. Scaling Laws for Inflow Generation Techniques for Large Eddy Simulation of Turbulent Boundary Layer. Bohr, E., Bailon-Cuba, J., Castillo, L. and Jansen, K., *American Physical Society, 57th Annual Meeting of the Division of Fluid Dynamics*, 21-23, November, Seattle, Washington, abstract #ED.002, (2004).
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68. Transpired Turbulent Boundary Layers Subject to Forced Convection and External Pressure Gradient. Cal, R. and Castillo, L., *American Physical Society- Division of Fluid Dynamics, 56th Annual Meeting*, November 23-25, NJ, abstract #DA.007, NJ (2003).
69. New Measurements in Increasingly Adverse Pressure Gradient Turbulent Boundary Layers. Anderson, C., Turan, O., Brzek, B. and Castillo, L., *American Physical Society-Division of Fluid Dynamics, 56th Annual Meeting*, November 23-25, NJ, abstract #FA.003, (2003).
70. Equilibrium, Self-Preserving and Self-Similar Solutions in Diffuser Flows with Developing Inlet. Castillo, L. Turan, O. and Brzek, B., *American Physical Society- Division of Fluid Dynamics, 56th Annual Meeting*, November 23-25, East Rutherford, New Jersey, abstract #FA.002, (2003).
71. 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).
72. 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).
73. 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)
74. 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).
75. 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).

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77. 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).
78. 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 18-20, abstract #FF.008, (2001).
79. 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).
80. 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).
81. 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).
82. 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).
83. 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).
84. 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).
85. 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).
86. 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 - 2013).
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. Review of Manuscripts, Books, Abstracts & Research Proposals

Reviews of Manuscripts: 1999- 2014

- 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

- 2013, 2012 August

- 2011 May
- 2010 March, May, August⁴
- 2009 January, April, May, June, July⁵
- 2008 July,⁶ December
- 2007 November, December
- 2006 May, August
- 2005 March, August
- 2004 August
- 2002 June
- 2001 January

NASA and Ford Foundation: Panel Reviews

- 2013, 2014 March- Ford Foundation (review for fellowship proposals).
- 2008 May- NASA (review for fellowship proposals).
- 2004 March- 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

XI. 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 Seccession 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. Marshall at Graduation Ceremony, 2008- 2009.

⁴NSF-CBET: Energy for Sustainability

⁵NSF-CBET: Energy for Sustainability

⁶NSF-CBET: Energy for Sustainability

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. Patrick Russo- 2011: POD & LSE Tools for Noise Generation in Turbulent Boundary Layers.
2. Jason Li- 2011: Wind Tunnel Measurements of Wind Turbines Subject to Geometric Modifications.
3. Christian Baressi- 2011: Multiscale Analysis of Transonic Turbulent Boundary Layers Subject to External Pressure Variation.
4. Kate Unverzart- Summer 2010: Atmospheric Turbulent Boundary Layer in Wind Farms.
5. Francis Lam- 2010: Issues on Renewable Energy.
6. Gustavo Rivera- 2007, 2008, 2009 URP: On Wind Energy Challenges for the Caribbean.
7. Hector Morales- 2009, URP: Turbulent Flows Subject to HFT (now PhD student at Johns Hopkins).
8. Kayle Gosh- 2008 URP: Computational Methods on Turbulent Boundary Layers.
9. Hector Morales- 2008 URP: High Speed Flows in Re-entry Applications.
10. Jared Delahanty- 2007 URP: Design of Hybrid-Wind Turbine System.
11. Marguerite Harrington- 2007 URP: Solar Energy Application in Wind Tunnel Facility.
12. Kerwin Low- 2006 RPI URP: Water Tunnel Facility and Flow Viz (now PhD student at Syracuse University).

13. Joe Richey- 2005 RPI URP: Data Analysis on Forced Convection.
14. Miguel Salgado- 2005 URP: Water Tunnel Studies/Bio-engineering. Co- Advisor: M. Amitay (Student from Puerto Rico).
15. Donald Chao- 2004, RPI, AGEP and URP: Adverse Pressure Gradient Turbulent Boundary Layers (international Experience in Australia).
16. Jenny Castillo- 2003 RPI URP: Compressible Boundary Layers.
17. Brian Brzek- 2002 URP: Rough Adverse Pressure Gradient Flows
18. Raul Cal- 2000, 2001 URP: High Reynolds Number Measurements in ZPG flows (international Experience in Canada).
19. 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.

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

Invited Papers

1. 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.
2. 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. Pseudo Spectral Analysis of the Energy Entrainment in a Scaled Down Wind Farm. Department of Mathematics. Rice University, Houston, TX (2014).
2. Why Turbulence is a Big Deal on Wind Energy? Department of Mechanical Engineering, Purdue University. West Lafayette, IN (2014).

3. On Wind Energy- It is all about Turbulence. Department of Mechanical Engineering, University of North Carolina-Charlotte. Charlotte, NC (2014).
4. Why Turbulence is a Big Deal in Wind Energy? Department of Mechanical Engineering, University of Cincinnati, Oh (2014).
5. Turbulence: The Big White Elephant in Wind Energy. Department of Mechanical Engineering, Cornell University, Ithaca, NY (2014).
6. On Wind Plant Aerodynamics. Department of Aerospace Engineering, Virginia Tech, Virginia (2013).
7. Large Scales of Turbulence on Wind Energy Performance. Department of Mechanical Engineering, Universidad Federico Santa Maria, Valparaiso, **Chile** (2013).
8. Wind Plant Aerodynamics: On Large Scales of Turbulence on Wind Energy. Department of Mechanical Engineering, Pontifica Universidad Catolica de Chile, Valparaiso, **Chile** (2013).
9. The Importance of Turbulence on Wind Energy. Department of Mechanical & Aerospace Engineering, Monash University, Melbourne, **Australia**, (2013).
10. On Wind Energy: It is About Turbulence. Department of Mechanical Engineering, Melbourne University, Melbourne, **Australia**, (2013).
11. Two versus Three Blades Rotors in Wind Energy Performance and Energy Entrainment. Department of Mechanical Engineering, Southern Methodist University, TX (2013).
12. Spectral Analysis in Wind Farm Performance and Energy Entrainment. Department of Mechanical Engineering, University of Puerto Rico-Mayaguez, PR (2013).
13. On Large Scales of Turbulence in the Energy Entrainment of Wind Arrays. Department of Mechanical Aerospace Engineering, Syracuse University, NY (2013).
14. 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).
15. Large Scales of Turbulence in the Energy Entrainment of Wind Arrays. Department of Civil Engineering, University of Minnesota, Minnesota (2012).
16. The Role of Turbulence in the Energy Exchange in Wind Turbine Arrays and Aerodynamics Performance. Denmark Technology University/ Riso, **Denmark** (2012).
17. The Role of External Conditions on the Aerodynamic Performance Wind Turbine Blades. GE, Wind Power, Greenville, South Carolina, (2012).
18. Large Scales Motion in Turbulence on Wind Energy. Department of Mechanical Aerospace Engineering, Arizona State University, Arizona (2012).
19. The Role of Turbulence in the Energy Exchange in Wind Turbine Arrays. GE, Wind Power, Greenville, South Carolina, (2012).

20. Large Scales Motion of Turbulence in Wind Energy. Department of Aerospace Engineering, Iowa State University, Iowa (2012).
21. The Importance of Turbulence on Wind Energy. National Center For Atmospheric Research, Boulder, Colorado (2012).
22. On Turbulence and Wind Energy at Various Scales. National Center for Renewable Energy, Boulder, Colorado (2012).
23. Undergraduate Research Experience: A MUST. College of Arts & Science, San Juan, PR (2012).
24. The Role of Turbulence in Wind Farm Underperformance and Entrainment of Kinetic Energy. Department of Aerospace Engineering, University of Texas-Austin, Austin, TX (2011).
25. The Importance of Turbulence in Wind Energy. GE Global Research, Niskayuna, NY (2011).
26. The NWRC in Texas and the Role of Turbulence in Wind Arrays Underperformance. Department of Mechanical Engineering, University of Rome 2, Rome, **Italy** (2011).
27. DNS of Turbulent Boundary Layers with Surface Roughness. Department of Aerospace Engineering, University of Rome La Sapienza, Rome, **Italy** (2011).
28. 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).
29. On Wind Energy: The Importance of Turbulence in Energy Exchange and External Loads. Vestas America, Houston, Texas (2011).
30. On Turbulence and Wind Energy. Department of Aerospace Engineering, Virginia Tech, Virginia (2011).
31. On Wind Energy: A Fundamental Perspective Toward Understanding Wind Farms Underperformance. Sandia National Laboratory, Albuquerque, New Mexico (2012).
32. The Role of Turbulence in Wind Energy: From Single Blade to Array. Department of Oceanography, University of Miami, Miami, Florida (2012).
33. POD Analysis and Large Scales Motions of Turbulence in Wind Arrays. Department of Civil Engineering, University of Minnesota, Minneapolis, Minnesota (2012).
34. On Wind Energy: It is All About Turbulence. University of Minnesota, Department of Mechanical Engineering, Minnesota, April (2010).
35. Large Scale of Turbulence in Boundary Layers. Department of Mechanical Engineering, Portland State University, October (2010).
36. A Multiscale Scale Dynamic Approach for Spatially-evolving Flows. Cornell University, Sibley School of Mechanical and Aerospace Engineering, Ithaca, March (2010).

37. Wind Energy & Turbulence. University of Puerto Rico-Mayaguez, Department of Mechanical Engineering, Puerto Rico, March (2010).
38. DNS for ZPG & APG Flows via Similarity Analysis. University of Rome 2, Department of Mechanical Engineering, Rome, **Italy**. May (2009).
39. 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).
40. Highly Turbulent Freestream Over Rough Surface Turbulent Boundary Layers. Air Force Research Laboratory, Dayton, OH, January (2008).
41. International Collaboration Initiative On Renewable Energy. Municipality of Caguas, Presented to Hon. Major William Miranda Marin, Caguas, Puerto Rico. March, (2007).
42. International Center for Energy and Sustainability. Brookhaven National Lab, NY. February, (2007).
43. Application of Equilibrium Similarity in Pressure Gradient Experiments and Simulations. The Johns Hopkins University, MD. February, (2006).
44. The MANE Department at Rensselaer. Colegio de Ingenieros de Venezuela, Caracas, **Venezuela**, September (2006).
45. The Climate Wind Tunnel Simulator & Multi-Disciplinary Center. Puerto Rico Industrial Development Company, San Juan, PR, (2006).
46. Multi-Disciplinary Center. Major of Caguas, November, PR, (2006).
47. Rough Surface Turbulent Boundary Layers its Initial Conditions. Department of Mechanical Engineering, Polytechnic University of New York, February (2004).
48. 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).
49. On Rough Surface Turbulent Boundary Layers. Victoria University, **Australia**, August (2003).
50. Investigation of the Upstream Conditions and Surface Roughness in Turbulent Boundary Layers. University of Puerto Rico-Mayaguez, Puerto Rico, May (2003).
51. Investigation of Various Effects in Turbulent Boundary Layers. University of Manitoba, Winnipeg, **Canada**, March (2003).
52. Asymptotic Solutions in Forced Convection Turbulent Boundary Layers Subject to External Pressure Gradient. Department of Mechanical Engineering, City University of New York, January, (2003).
53. Equilibrium and Non-equilibrium Turbulent Boundary Layers. University of Minnesota, Department of Civil Engineering. February, (2002).

54. Flow Induced Vibration. NASA Stennis Space Center, Mississippi, (2001).
55. On Boundary Layers at High Reynolds Number. NAVY-Large Cavitation Water Tunnel, Memphis, Tennessee, (2001).
56. Maximizing Your Graduate Degree. Tech Symposium 2000, Miami Beach, Florida July 19-22, (2000).
57. EquilibriumType Similarity Analysis in Turbulent Boundary Layers. University of Western Ontario, London, **Canada**, May 22, (2000).
58. Creating your Own Opportunities in the 21st Century. Society of Hispanic Professional Engineers, SHPE, Syracuse University, Syracuse, NY, April 29, (2000).
59. Pushing the Envelop in Technology by Diversity, Society of Hispanic Professional Engineers, University at Buffalo, Buffalo, April 21, (2000).
60. New Perspectives in Turbulent Boundary Layers. Rensselaer Polytechnic Institute Math Department, April 14, (2000).
61. Application of EquilibriumType Similarity Analysis in Turbulent Boundary Layers. Clarkson University, Potsdam, NY April 4, (2000).
62. New Understanding of Turbulent Boundary layers with Pressure Gradient. Department of Thermo-Fluid Sciences, Chalmers University of Technology, Gothenburg, **Sweden**, June, (1999).
63. Similarity of Turbulent Boundary Layers with Pressure Gradient. Department of Mechanics, Swedish Royal Institute of Technology (KTH), Wall Jet Meeting, Stockholm, **Sweden**, June, (1999).
64. A Breakthrough in Turbulent Boundary layers with Pressure Gradient. ONR, Division of Fluid Mechanics, Office of Naval Research, Virginia, April, (1999).
65. Pressure Gradient Turbulent Boundary Layers: The Outer Flow. Department of Mechanical Engineering, Rensselaer Polytechnic Institute, February, (1999).
66. Pressure Gradient Turbulent Boundary Layers: The Outer Flow. Department of Mechanical Engineering, University of Puerto Rico, Mayaguez Campus, Mayaguez, Puerto Rico, February, (1999).
67. The Zero Pressure Gradient Turbulent Boundary Layers. Department of Turbomachinery, Praxair, Buffalo, NY. November, (1996).

Contributed Papers and Lectures

1. 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).
2. 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.

3. 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).
4. The Role of Turbulence in the Energy Exchange in Wind Turbine Arrays and Aerodynamics Performance. Society of Professional Engineers. Dallas, TX, (2012).
5. 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).
6. 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).
7. 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).
8. Onshore Wind Power: Wind Energy & Turbulence. *2010 Advanced Energy Conference*, New York, New York (2010).
9. DNS of Very Strong Adverse Pressure Gradient Flows with Separation. *iTi Conference on Turbulence IV*, Bertinoro, **Italy**, (2010).
10. DNS of Turbulent Boundary Layer Subject to Surface Roughness. ONR Annual Program Review, Annapolis, Maryland, (2010).
11. Numerical & Experimental Studies in Developing Turbulent Flows Via Multi-Scale Similarity. ONR Annual Program Review, University of California at San Diego, (2009).
12. 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).
13. 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).
14. Smooth & Rough Favorable Pressure Gradient Turbulent Boundary Layers: The Inner Flow. 5th Theoretical Fluid Mechanics Conference, AIAA-2008-4346, Seattle, Washington, June (2008).
15. Highly Turbulent Freestream Over Rough Surface Turbulent Boundary Layers. 46th Aerospace Sciences Meeting & Exhibit, AIAA-2008-0644, Reno, Nevada January (2008).

16. Initial Conditions Effects on Turbulent Boundary layers Subjected to Favorable Pressure Gradient. 4th Theoretical Fluid Mechanics Conference, AIAA-2005-4812, Toronto, Canada, (2005).
17. 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).
18. 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).
19. Velocity Profiler Similarity-Based Technique for Measuring the Shear Stress. California Institute of Technology, February 5-6, (2004).
20. 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).
21. 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).
22. Rough Surface Turbulent Boundary Layer: The Composite Profile. 42nd Aerospace Sciences, Meeting & Exhibit, AIAA-2004-1287, January 5-8, Reno, Nevada, (2004).
23. 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).
24. The Asymptotic Profiles in Forced Convection Turbulent Boundary Layers. IUTAM Symposium on Reynolds Number Scaling in Turbulent Flow, Princeton University, NJ, (2003).
25. The Composite Profile Forced Convection Turbulent Boundary Layer with and without Pressure Gradient. ASME Summer Fluids Meeting-FEDSM-2003, Hawaii, (2003).
26. Self-Similar Solutions in Turbulent Boundary Layers. 41st Aerospace Sciences Meeting & Exhibit, AIAA-2002-0612, Reno, Nevada, January (2003).
27. Equilibrium, Self-Preserving and Self-Similar Solutions in Diffuser Flows with Developing Inlet. American Physical Society Division of Fluid Dynamics, NJ, (2003).
28. Self-Similar Solutions in Forced Convection. 9th Latin American Congress of Heat and Mass Transfer, San Juan, PR, (2002).
29. 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).

30. 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).
31. The Effect of the Initial Conditions on Turbulent Boundary Layers. 31st AIAA Fluid Dynamics Conference, AIAA 2001-2913, Anaheim, CA, June, (2001).
32. 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).
33. 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).
34. Designing a ZPG Experiment Using the George/Castillo Theory. 1000 Island Fluids Mechanics Conference, **Canada**, (2000).
35. 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).
36. The Effect of the Upstream Conditions on the Deficit of Turbulent Boundary Layers. 34th Aerospace Sciences Meeting & Exhibit, Denver, Colorado June 19-22, (2000).
37. 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:A MUST. 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 AGEPR 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. AGEPR 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? AGEPR Mentor Meeting, Puerto Rico, June (2004).

XIII. 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**.

XIV. 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 Jan-

- uary 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 success 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: Al 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.
- Technical Committee, Gallery of Fluid Motion, American Physical Society, 2003-2004.

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).