J. Guillermo Araya

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RESEARCH INTERESTS

Computational fluid dynamics of incompressible/compressible boundary layers, turbulence, DNS, LES, RANS, numerical heat transfer, parallel programming, algorithm development, fluid-structure interaction, wind energy, flow/heat transfer control, aerodynamics, atmospheric boundary layer.

EDUCATION

- **Ph.D.** (August 2008), Aeronautical Engineering-Rensselaer Polytechnic Institute (RPI), Troy, NY, USA. (GPA: 4:00/4:00)

Dissertation: *DNS of Turbulent Wall Bounded Flows With a Passive Scalar.*

- **M.S.** (2004) Mechanical Engineering-University of Puerto Rico (UPRM), Mayagüez, PR, USA (GPA: 4:00/4:00)

Dissertation: *Transient, Three-Dimensional Numerical Model of Laser Cutting Processes in Ceramics with Phase Change Consideration.*

- **Specialization Course** (1997) Specialist in Nuclear Energy Technological Applications-Balseiro Institute and University of Buenos Aires, Argentina.

- **B.S.** (1996) Aeronautical Engineering-Instituto Universitario Aeronautico, Cordoba, Argentina.

Dissertation: *Static and Dynamic Stability Analysis of an Air-Ground Missile.*

PROFESSIONAL APPOINTMENTS

- **Assistant Professor –** Department of Mechanical Engineering, University of Puerto Rico, Mayaguez, Puerto Rico, USA (09/2015-Present)

- **Research Assistant Professor –** Department of Mechanical Engineering, Texas Tech University, Lubbock, Texas, USA (09/2011-08/2015)

- **Research Assistant –** School of Engineering, Civil and Computational Engineering Centre, Swansea University, UK (01/2009-08/2011)

- **Postdoctoral Fellow –** Department of Mechanical Engineering, Johns Hopkins University (07/2008-12/2008). Supervisor: Prof. Charles Meneveau.

RESEARCH EXPERIENCE

- **Visiting Scholar –** Rensselaer Polytechnic Institute (Nov. 2009) and Portland State University (Nov. 2010), USA.
- **Visiting Student –** Department of Mechanical Engineering, Johns Hopkins University (01/2008-07/2008). Supervisor: Prof. Charles Meneveau.
- **Research Assistant –** Rensselaer Polytechnic Institute (08/2004-12/2007) – Performed computational fluid dynamics (CFD) of the velocity and thermal fields over streamwise homogeneous and non-homogeneous turbulent flows by using Direct Numerical Simulations (DNS).
- **Research Assistant –** University of Puerto Rico at Mayagüez (2003-2004) **–** Developed a 3D-transient heat transfer model (FORTRAN code) in finite volume and an analytical solution for simulating evaporative laser cutting processes. Another project involved numerical predictions of the time-response of a thin film temperature sensor in a lubricated contact.

- **Lab Assistant –** Constituyentes Atomic Center, Buenos Aires, Argentina (1997) – Detected and measured cracks induced by fatigue in metals through Non-Destructive Tests (NDT): radiographic, ultrasonic, eddy-current and dye penetrant techniques.
- **Research Assistant –** Argentine Air Force, Córdoba, Argentina (1996) – Designed an air-ground missile. Performed CAD prototype design and drawing, aerodynamic load distribution analysis through "Panel Method" FORTRAN software, drag determination in wind tunnel, range and static/dynamic stability analysis.

TEACHING EXPERIENCE
- **Assistant Professor –** University of Puerto Rico at Mayaguez**:** Applied Aerodynamics, Aircraft Performance and Heat Transfer (undergraduate courses)
- **Research Assistant Professor –** Texas Tech University**:** Heat Transfer (undergraduate Summer I and II 2015), Boundary Layer Theory (graduate, Spring 2012)
- **Graduate Teaching Assistant –** Rensselaer Polytechnic Institute (2004-2006): Thermal Fluids and Engineering II, Aerodynamics I and Fundamentals of Flight (undergraduate)
- **Graduate Teaching Assistant and Laboratory Instructor –** University of Puerto Rico at Mayaguez (2003-2004): Thermal Sciences in Mechanical Engineering (undergraduate)
- **Instructor –** EET N° 7, Quilmes, Argentina and EET N° 4, El Palomar, Argentina (2001-2002) – Taught courses in technical colleges of aeronautics: Aerodynamics, Statics, Resistance of Materials and Quality Management.

INDUSTRIAL EXPERIENCE
- 02/2001 – 12/2002: Self – employed
Quality Management Consultant: Conducted ISO 9000:2000 counseling in companies and industries for quality norm certification.
- 05/1998 – 01/2001: Coca-Cola FEMSA of Buenos Aires (Blowing Area)
Quality Supervisor: Performed quality control management of the blowing process (PET bottles), statistical control of process, internal quality auditing and training of personnel.

PATENTS
- *Coca-Cola FEMSA of Buenos Aires (1999)*: Participated in the design of an automatic instrument to test the stress cracking resistance in PET bottles (patent in Argentina AR016047B1).

EXTERNAL GRANTS
Current Funded Research Proposals
- "Collaborative Research: Effects of wall curvature on hypersonic turbulent spatially-developing boundary layers", AFOSR, $331K, 12/15/2016 to 12/14/2019, role: PI.
- "Identification of Lagrangian Coherent Structures (LCS) in accelerating turbulent boundary layers", Blue Waters Student Internship Program, $5K, 05/29/2017 to 05/31/2018, role: Mentor.
- "High-end visualization of coherent structures and turbulent events in wall-bounded flows with a passive scalar", GECAT-NCSA, $25K, 09/09/2017 to 08/31/2019, role: PI.
- "Effects of streamwise pressure gradients and thermal stratification on jets in crossflow via DNS", XSEDE, 168K core-hours (estimated value of $6,140), 04/01/2017 to 03/31/2018, role: PI.
- "NSF/ONR (International): The role of inlet perturbations on superstructures of turbulent boundary layers-toward global flow control (in collaboration with the U. of Melbourne, Australia)", NSF-CBET #1512393 co-funded by ONR, total $718K, 07/01/2015 to 06/30/2018, role: Co-PI.
- "NSF-PIRE: USA/Europe partnership for integrated research and education in wind energy intermittency: from wind farm turbulence to economic management (in collaboration with Johns Hopkins University)", NSF-PIRE #1243482, $758K, 10/01/2012 to 09/30/2018, role: Senior Personnel.

Past Funded Research Proposals
- "Collaborative research: Assessment of high winds in North Norway via the WRF model for wind energy applications", TTU-IRDD Seed grant, $2K, 03/01/2015 to 03/01/2016, role: PI.
- "Renewable Energy Initiative", ETF #22R031, $50K, 09/01/2013 to 04/10/2017, role: PI.

- "Travel Fund for a Norwegian Visiting Scholar at TTU", NTF-FU 84-13, Arctic University of Norway (UiT), Norway, $26550, 05/01/2014 to 10/31/2014, role: Hosting Advisor.
- "Symposium on Frontiers of Fluid Dynamics-A Legacy", NSF-CBET #1360659, $15K, 10/01/2013 to 09/30/2014, role: Co-PI.
- "Effects of extreme external conditions on turbulent structures in a boundary layer", XSEDE, 650K CPU hours, 08/15/2012 to 04/30/2014, role: PI.
- "Understanding stratification and wake evolution due to thermal fields for wind-turbine array over a rough-terrain (in collaboration with U. of Texas San Antonio)", NSF-CREST #1242180, $25K, 10/01/2012 to 04/30/2014, role: PI.
- "DNS of the temperature field on turbulent spatially-developing boundary layers with wall roughness", HYDAC Technology Corp, $7,573, 08/01/2013 to 12/31/2013, role: PI.
- "Numerical analysis of film cooling on turbulent spatially-developing boundary layers", General Electric Global Research, $24,076, 11/01/2011 to 07/31/2012, role: PI.
- "Gust generation modelling for aeronautical purposes", Hector Supercomputer (UK), £11,419, 1.6M CPU hours, 07/01/2011 to 12/31/2011, role: Co-PI.
- "Numerical & Experimental Studies in Developing Turbulent Flows Via Multi-Scale Similarity", NSF-CBET #0829020 and Co-funded with Office of Naval Research (ONR), $416K, 09/01/2008 to 08/31/2011, role: Senior Personnel.
- "Scale adaptive simulations of turbulent flows", Hector Supercomputer (UK), £2,724, 200K CPU hours, 01/15/2010 to 07/15/2010, role: Co-PI.
- "LES and DNS of Turbulent Spatially Evolving Boundary Layers in Pressure Gradient Flows Via Multi-Scale Method", TeraGrid, 882K CPU hours, 11/07/2008 to 09/30/2012, role: Co-PI.
- "Thermal Boundary Layer Simulations Under Adverse Pressure Gradients", TeraGrid, 250K CPU hours, 01/04/2007 to 12/31/2007, role: Co-PI.

AWARDS AND MAJOR ACHIEVEMENTS
- Travel award by XSEDE to attend "Visualizing and Interacting with Data" workshop at Texas Advanced Computing Center (TACC) June 19-24, 2017.
- Travel award to attend the 69th Annual Meeting of the APS Division of Fluid Dynamics (November 20-22, 2016 Portland, OR) provided by XSEDE.
- Travel award by XSEDE to attend "Inquiry-Based Science and Mathematics Enhanced by Computational Thinking" workshop at Oklahoma State University, May 16 – 18, 2016.
- Selected for inclusion in the 11th Edition of Marquis Who's Who in Science and Engineering (2011 - 2012)
- Selected as supported student in the 13th Annual Summer Institute: Reducing Your Time To Solution, San Diego Supercomputer Center (July 2007, La Jolla, CA)
- *Selected as young participant in the "Euler Equations: 250 Years On" conference with travel subsidy from NSF (June 2007, Aussois, France)*
- Travel subsidy award from European Commission (Marie Curie program) for participating in the 11th European Turbulence Conference (June 2007, Porto, Portugal)
- Teaching/Research Assistantship and Tuition Scholarship at UPRM and RPI (2003-2008)
- Travel subsidy awards (2005 and 2006): Division of Fluid Dynamics of the American Physical Society.
- Full Scholarship (2001): CANE Foundation – Georgia Institute of Technology, training in ISO 9000:2000 Norms.
- Full Scholarship (1997): the National Atomic Energy Commission (CNEA), Argentina, Specialization Course.

PUBLICATIONS
Journal Articles (* indicates corresponding author)
[J21] **Araya G.(*)** and Rodriguez D., *Visualization and assessment of turbulent coherent structures in laminarescent boundary layers*. J. of Visualization, 21, pp 191-202, 2017.
[J20] Liu C., **Araya G.(*)** and Leonardi S., *The role of vorticity in the turbulent/thermal transport of a channel flow with local blowing*, in press, Computers and Fluids, 2017**.**

[J19] Gutierrez W., **Araya G.**, Kiliyanpilakkil V.P., Ruiz-Columbie A., Tutkun M. and Castillo L.(*) *Structural impact assessment of Low Level Jets over wind turbines*, J. of Renewable and Sustainable Energy, 8, 023308, 2016.

[J18] Dharmarathne S., Tutkun M., **Araya G.**, Castillo L.(*), *Structures of scalar transport in a turbulent channel*, European Journal of Mechanics B-Fluids, Vol. 55, Part 2, pp 259-271, 2016.

[J17] Doosttalab A., **Araya G.(*)**, Newman J., Adrian R., Jansen K., Castillo L., *Effect of small roughness elements on thermal statistics of a turbulent boundary layer at moderate Reynolds number*, J. of Fluid Mechanics, Vol. 787, pp 84 – 115, 2015.

[J16] **Araya G.(*)**, Castillo L. and Hussain F., *The log behavior of the Reynolds shear stress in accelerating turbulent boundary layers*, J. of Fluid Mechanics, Vol. 775, pp 189 – 200, 2015.

[J15] Kiliyanpilakkil V. P., Basu(*) S., Ruiz-Columbié A., **Araya G.**, Castillo L., Hirth B., and Burgett W., *Buoyancy effects on the scaling characteristics of atmospheric boundary-layer wind fields in the mesoscale range*, Phys. Rev. E 92, 033005, 2015.

[J14] Bilal M.(*), **Araya G.**, Birkelund Y., *Preliminary assessment of remote wind sites*, Energy Procedia, Energy Procedia, 75, 658 – 663, 2015.

[J13] Cardillo J., Chen Y., **Araya G.(*),** Newman J., Jansen K. and Castillo L., *DNS of turbulent boundary layers with surface roughness*, J. of Fluid Mechanics Vol. 729, pp 603 – 637, 2013.

[J12] **Araya G.(*)** and Castillo L., *DNS of turbulent thermal boundary layers subjected to adverse pressure gradients,* Physics of Fluids, 25, 095107, 2013.

[J11] **Araya G.(*)** and Castillo L., *DNS of turbulent thermal boundary layers up to $Re_\theta = 2300$*, Int. Journal of Heat and Mass Transfer, Volume 55, Issues 15–16, 4003-4019, 2012.

[J10] **Araya G.(*)**, Castillo L., Meneveau C. and Jansen K., *A dynamic multi-scale approach for turbulent inflow boundary conditions in spatially evolving flows*, J. of Fluid Mechanics Vol. 670, pp. 581–605, 2011.

[J9] **Araya G.(*)**, Leonardi S. and Castillo L., *Steady and time-periodic blowing/suction perturbations in a turbulent channel flow*, Physica D 240 pp. 59–77, 2011.

[J8] **Araya G.(*)**, Jansen K. and Castillo L., *Inlet condition generation for spatially-developing turbulent boundary layers via multi-scale similarity*, J. of Turbulence, 10, No. 36, pp. 1-33, 2009.

[J7] **Araya G.(*)**, Leonardi S. and Castillo L., *Numerical assessment of local forcing on the heat transfer in a turbulent channel flow*, Physics of Fluids, 20, 085105, 2008.

[J6] **Araya G.(*)**, Leonardi S. and Castillo L., *Passive scalar statistics in a turbulent channel with local time-periodic blowing/suction at walls*, Physica D, 237, pp. 2190–2194, 2008.

[J5] Wang X.(*), Castillo L. and **Araya G.**, *Temperature scalings and profiles in forced convection turbulent boundary layers*, Journal of Heat Transfer, Vol.130, 2, 2008.

[J4] **Araya G.(*)**, Leonardi S., Castillo L. and Orlandi P., *DNS of turbulent channel flow with local forcing at walls,* International Journal of Transport Phenomena, Vol. X, pp. 1–13, 2007.

[J3] Jia Y.(*) and **Araya G.**, *Numerical analysis of the design parameters on the performance of thin film temperature sensors*, Measurement Science and Technology, 18, pp. 2268–2274, 2007.

[J2] **Araya G.(*)** and Gutierrez G., *Analytical solution for a transient, three-dimensional temperature distribution due to a moving laser beam,* Int. Journal of Heat and Mass Transfer, 49 (21-22): 4124-4131, 2006.

[J1] Jia Y.(*) and **Araya G.**, *Dynamic performance of thin film temperature sensor in a lubricated contact,* Proc. of the Institution of Mechanical Engineers, Part J, Journal of Engineering Tribology, 220 (J6): 487-497, 2006.

Publications in Refereed Chapter Books

[B6] **Araya G.**, Castillo L. and Hussain F., *DNS of turbulent boundary layers in the quasi-laminarization process*, Wall-Turbulence Meeting, Lille, France. ERCOFTAC series, Springer, 2014.

[B5] **Araya G.**, Castillo L. and Jansen K., *DNS of stable spatially developing turbulent thermal boundary layers under weak stratification*, In Progress in Turbulence V, Springer Proceedings in Physics, 2013.

[B4] **Araya G.** and Castillo L., *DNS of turbulent boundary layers subjected to adverse pressure gradients*, In Progress in Turbulence IV, Springer Proceedings in Physics, 2012.

[B3] **Araya G.**, Evans B., Hassan O. and Morgan K., *Scale adaptive simulations over a supersonic car*, Computational Fluid Dynamics, Springer-Verlag, 2010.

[B2] **Araya G.**, Castillo L., Meneveau C. and Jansen, K., *A multi-scale dynamic method for spatially evolving flows*, Progress in Wall Turbulence: Understanding and Modeling, ERCOFTAC series, Springer, 2009.

[B1] **Araya G.**, Bohr E., Jansen K. and Castillo L., *Generation of turbulent inlet conditions for velocity/thermal boundary layer simulations*, In Progress in Turbulence II, Springer Proceedings in Physics, vol. 109, 2006.

Articles in Refereed Conference Proceedings

[C21] Quinones C., **Araya G.** and Chen Y., *Thermal transport in a crossflow jet subject to a very strong favorable pressure gradient.* Procs. of ASME 2017 International Mechanical Engineering Congress and Exposition IMECE 2017, November 3-9, 2017, Tampa, USA.

[C20] **Araya G.**, *Shedding Light into the Quasi-Laminarization Process*, 46th AIAA Fluid Dynamics Conference, AIAA AVIATION Forum, (AIAA 2016-3188) 13 - 17 June, Washington, DC, 2016.

[C19] Bilal M., Sridhar N., **Araya G.**, Parameswaran S., Birkelund Y., *Wind flow over a complex terrain in Nygardsfjell, Norway*, Proc. of the ASME 2015 Energy Solutions for a Sustainable Future, June 28-July 2, 2015, San Diego, USA.

[C18] Kiliyanpilakkil P., Gutierrez W., **Araya G.**, Basu S., Ruiz-Columbie A., Castillo L., *Understanding the Low-level jet characteristics using the WRF model over the West Texas Region*, Proc. of the NWRC Summer Research Institute, June-July 2014, Lubbock, Texas, USA.

[C17] Gutierrez W., **Araya G.**, Basu S., Ruiz-Columbie A. and Castillo L., *Toward Understanding Low Level Jet Climatology over West Texas and its Impact on Wind Energy*, Journal of Physics: Conference Series 524 (2014) 012008. doi:10.1088/1742-6596/524/1/012008

[C16] Debnath M., **Araya G.**, Castillo L. and Bhaganagar K., Proposing dynamic multiscale method and convective outlet condition in SOWFA, Proc. of the NWRC Summer Research Institute, June-July 2013, Lubbock, Texas, USA.

[C15] **Araya G.**, Castillo L., Ruiz-Columbie A., Schroeder J. and Basu S., *On the similarities of the engineering and atmospheric boundary layers*, Proceedings of the 20th Symposium on Boundary Layers and Turbulence, 9-13 July 2012, Boston, MA, USA.

[C14] **Araya G.**, Chen Y. and Castillo L., *Turbulent thermal boundary layers simulations in rough walls via DNS*, 7th International Conference on Computational Fluid Dynamics (ICCFD7), Big Island, Hawaii, July 9-13, 2012.

[C13] **Araya G.** and Castillo L., *DNS of Thermal Turbulent Boundary Layers Subject to External Pressure Gradient*, 6th AIAA Theoretical Fluid Mechanics Conference 27 - 30 June, Honolulu, Hawaii, 2011.

[C12] **Araya G.**, Evans B., Hassan O. and Morgan K., *Assessment of several turbulence models in a supersonic car*, 5th ECCOMAS CFD, Lisbon, Portugal, 2010.

[C11] **Araya G.**, Cal R.B. and Castillo L., *Energy budget analysis for favorable pressure gradient turbulent boundary layers using Direct Numerical Simulations*, 8th ERCOFTAC Symposium on Eng. Turbulence Modelling and Measurement, Marseille, France, 2010.

[C10] Cardillo J., Chen Y., **Araya G.**, Jansen K. and Castillo L., *DNS of turbulent boundary layers with surface roughness*, 8th ERCOFTAC Symposium on Eng. Turbulence Modelling and Measurement, Marseille, France, 2010.

[C9] **Araya G.**, Jansen K. and Castillo L., *DNS of forced convection turbulent boundary layers in ZPG/APG flows*, 5th AIAA Theoretical Fluid Mechanics Conference 23 - 26 June 2008, Seattle, Washington

[C8] **Araya G.**, Leonardi S. and Castillo L., *DNS of a passive scalar in a turbulent channel with local forcing at walls*, 5th Int. Symposium on Turbulence and Shear Flow Phenomena, August 27-29, 2007, Munich, Germany.

[C7] **Araya G.**, Leonardi S., Castillo L. and Orlandi P., *DNS of turbulent channel flow with local forcing at walls,* 17th Int. Symposium on Transport Phenomena, 4-8 September, 2006, Toyama, Japan.

[C6] **Araya G.**, Bohr E., Jansen K., Castillo L., and Peterson K., *Generation of turbulent inlet conditions for thermal boundary layers*, 44th AIAA Aerospace Sciences Meeting and Exhibit, Reno, Nevada, Jan. 9-12, 2006, AIAA-2006-699.

[C5] Jia Y. and **Araya G.**, *The influence of the design parameters on the performance of thin film temperature sensors*, Proceedings of World Tribology Congress III, ASME, September 12-16, 2005, Washington, D.C., USA.

[C4] Gutierrez G. and **Araya G.**, *Transient, three dimensional numerical model of a laser cutting process with phase change consideration*, Proceedings of IMECE: ASME Congress Anaheim, California, November 15-21, 2004.

[C3] Gutierrez G. and **Araya G.**, *Analytical solution for a transient three-dimensional temperature distribution in laser assisted machining processes*, Proceedings of NHTC04: 2004 ASME Summer Conference Charlotte, NC, USA.

[C2] Jia Y., **Araya G.** and Gutierrez G., *Numerical analysis of response time for thin film temperature sensors in lubricated contact*, Proceedings of NHTC04: 2004 ASME Summer Conference Charlotte, NC, USA.

[C1] Gutierrez G. and **Araya G.**, *Temperature distribution in a finite solid due to a moving laser beam*, Proceedings of IMECE: ASME Congress Washington, D.C., November 15-21, 2003.

Journal Articles in Preparation

[P3] Rodriguez D., Caro C., Lugo J. and **Araya G.**, *Visualization of turbulent structures in relaminarizing flows*, to be submitted to the J. of Visualization, 2017.

[P2] **Araya G.**, *Turbulence residual explanation in accelerating turbulent boundary layers*, to be submitted to Physics of Fluids, 2017.

SELECTED PRESENTATIONS

1) *DNS of spatially-developing turbulent boundary layers: visualization of turbulent events*. **Invited Speaker**. Barcelona Supercomputing Center, February 23 2017, Barcelona, Spain, 2018.

2) *Compressibility effect on thermal coherent structures in spatially-developing turbulent boundary layers via DNS*, 70th Annual Meeting, APS Division of Fluid Dynamics, November 2017, Denver, Colorado, USA.

3) *Effects of wall curvature on hypersonic turbulent spatially-developing boundary layers*. **Invited Speaker**. 2017 Annual Review for the AFOSR High Speed Aerodynamics Portfolio and the ONR Hypersonics Portfolio. July 27 2017, NASA Langley, Hampton, VA.

4) *DNS of Crossflow Jet Subject to Very Strong Favorable Pressure Gradient*. **Invited Speaker**. Soft Matter Seminar Series. REU Site, July 5 2017, UPRM, Mayaguez, PR.

5) *The laminarescent region in the quasi-laminarization process: a vorticity dynamics perspective*, 69th Annual Meeting, APS Division of Fluid Dynamics, November 2016, Portland, Oregon, USA.

6) *The Weather Research and Forecasting (WRF) model for wind energy applications*. **Invited Speaker**. Dep. of Mechanical Engineering, University of Puerto Rico at Mayaguez, October 2016, Puerto Rico, USA.

7) *Assessment of Turbulence Models in the Aerodynamic Design of a Supersonic Car: Breaking the Land Speed World Record*. **Invited Speaker**. Dep. of Mechanical Engineering, University of Puerto Rico at Mayaguez, September 2015, Puerto Rico, USA.

8) *Numerical simulations of turbulent flows: from fundamental knowledge to wind energy applications*. **Invited Speaker**. College of Science and Engineering, Texas A&M University-Corpus Christi, April 2015, Corpus Christi, Texas, USA.

9) *Drag Reduction Mechanisms in Pipe and Channel Flows*. **Invited Speaker**. Dep. of Mechanical Engineering, University of Texas at San Antonio, January 2015, San Antonio, Texas, USA.

10) *Evolution of the Reynolds shear stresses in highly accelerated turbulent boundary layers*, 67th Annual Meeting, APS Division of Fluid Dynamics, November 2014, San Francisco, California, USA.

11) *Modelling of low-level jet and katabatic events via WRF and understanding its structural impact on wind turbines.* **Invited Speaker**. Nov. 6 2014, University of Texas at Dallas, USA.

12) *DNS of Turbulent Boundary Layers in the Quasi-Laminarization Process,* Progress in Wall Turbulence: Understanding and Modelling. Lille, France, June 18-20, 2014.

13) *Spatially-Developing Turbulent Momentum/Thermal Boundary Layers with Adverse Streamwise Pressure Gradients via DNS.* **Invited Speaker**. Turbulence, Mixing and Flow Control seminar series, June 23 2014, Imperial College, London, UK.

14) *Turbulent thermal boundary layers subjected to severe acceleration*, 66th Annual Meeting, APS Division of Fluid Dynamics, November 2013, Pittsburgh, Pennsylvania, USA.

15) *Analysis of Low Level Jets (LLJs) and its implications for wind energy*, VIII Brazilian Micrometeorology Workshop, November 20-22, 2013 Santa Maria, RS, Brazil.

16) *Assessment of the Dynamic Multi-scale Approach (DMA) in turbulent momentum/thermal boundary layers subjected to APG.* **Invited Speaker**. Symposium on Frontiers in Fluid Dynamics, November 1-3, 2013, San Juan, Puerto Rico, USA.

17) *The importance of turbulent inflow conditions on unsteady numerical simulations of spatially-developing boundary layers* (DOI: 10.4172/2168-9873.S1.002) **Invited Speaker**, 137th OMICS Group Conference. International Conference and Exhibition on Mechanical & Aerospace Engineering. September 30 - October 02, 2013 Hilton San Antonio Airport, USA.

18) *DNS of stratified spatially-developing turbulent thermal boundary layers*, 65th Annual Meeting, APS Division of Fluid Dynamics, November 2012, San Diego, California, USA.

19) *Numerical research at the National Wind Resource Center*. **Invited Speaker**. Dep. of Aerospace Engineering, Politecnico di Milano, October 2012, Milan, Italy.

20) *DNS of stable spatially-developing turbulent thermal boundary layers under weak stratification*, Conference on Turbulence (iTi 2012), October 2012, Bertinoro, Italy.

21) *CFD of Turbulent Flows: from Wind Energy Applications to the Aerodynamic Design of a Supersonic Car*. **Invited Speaker**. Dep. of Mechanical Engineering, University of Texas at San Antonio, September 2012, San Antonio, Texas, USA.

22) *On the similarities of the engineering and atmospheric boundary layers*, 20th Symposium on Boundary Layers and Turbulence, 9-13 July 2012, Boston, MA, USA.

23) *Future Experimental Study to Compare the Effects of Two-Bladed and Three-Bladed Model Wind Turbine Designs in an Array*, Wind Farms' Underperformance & Partnerships: Building Partnerships to Meet the 2030 Grand Challenge, March 28 - 29 2012, Lubbock, TX, USA (poster).

24) *Stable and Unstable Thermal Stratified Boundary Layers*, Wind Farms' Underperformance & Partnerships: Building Partnerships to Meet the 2030 Grand Challenge, March 28 - 29 2012, Lubbock, TX, USA (poster).

25) *Numerical Tools for Solving Turbulent Wall-Bounded Flows*. **Invited Speaker**. CIMAT, March 2012, Guanajuato, Mexico.

26) *Computational Fluid Dynamics of Turbulent Wall-Bounded Flows*. **Invited Speaker**. Dep. of Mechanical Engineering, Texas Tech University, February 2012, Lubbock, Texas, USA.

27) *DNS of very strong adverse pressure gradient flows with eventual separation*, 64th Annual Meeting, APS Division of Fluid Dynamics, November 2011, Baltimore, Maryland, USA.

28) *DNS at High Reynolds numbers of Thermal Turbulent Boundary Layers Subjected to External Pressure Gradients*, 64th Annual Meeting, APS Division of Fluid Dynamics, November 2011, Baltimore, Maryland, USA.

29) *Numerical simulations of a supersonic car: The Bloodhound Project*. **Invited Speaker**. Portland State University, November 2010, Oregon, USA.

30) *DNS of turbulent heat transfer in spatially-developing flows*. **Invited Speaker**. Los Alamos National Laboratory, November 2010, New Mexico, USA.

31) *Unsteady numerical simulations over the BLOODHOUND supersonic car*, 63th Annual Meeting, APS Division of Fluid Dynamics, November 2010, Long Beach, California, USA.

32) *Scale adaptive simulations over a supersonic car*, 6th International Conference on CFD, St. Petersburg, Russia, 2010.

33) *The Use of Turbulence Models in the Aerodynamic Design of A Supersonic Car: Breaking the World Record*. **Invited Speaker**. Rensselaer Polytechnic Institute, November 2009, New York, USA.

34) *A dynamic multi-scale approach for turbulent inflow generation in spatially-developing boundary layers with streamwise pressure gradients*, 61th Annual Meeting, APS Division of Fluid Dynamics, November 2008, San Antonio, Texas, USA.

35) *Numerical heat transfer analysis in turbulent wall bounded flows*. **Invited Speaker**. University of Karlsruhe, January 2008, Karlsruhe, Germany.

36) *Active control of turbulent heat transfer by local forcing: an energy assessment*, 60th Annual Meeting, APS Division of Fluid Dynamics, November 2007, Salt Lake City, Utah, USA.

37) *DNS of heat transfer in a high Reynolds number turbulent channel flow with local forcing*, conference on "Euler Equations: 250 Years On", June 2007, Aussois, France (poster).

38) *Thermal boundary layers simulations under adverse pressure gradients,* 11th European Turbulence Conference, June 2007, Porto, Portugal (poster).

39) *DNS of a passive scalar in a turbulent channel with local forcing at walls*, 59th Annual Meeting, APS Division of Fluid Dynamics, November 2006, Tampa, FL, USA.
40) *Numerical analysis of drag reduction in a turbulent channel with local forcing.* **Invited Speaker**. September 2006, University of Puerto Rico-Mayaguez, USA.
41) *DNS of heat transfer in turbulent channel flows,* 2nd Annual Tech Valley Engineering Symposium, April 2006, Albany, NY, USA.
42) *DNS in a turbulent channel with periodic blowing/suction velocity boundary conditions*, 58th Annual Meeting, APS Division of Fluid Dynamics, November 2005 Chicago, IL, USA.
43) *Generation of turbulent inlet conditions for velocity/thermal boundary layer simulations*, iTi 2005 conference on Turbulence, September 2005, Bad Zwischenahn, Germany.
44) *Computational generation of turbulent inlet conditions in spatially evolving boundary layers,* 1st Annual Tech Valley Engineering Symposium, April 2005, Albany, NY, USA.

GRADUATE STUDENT ADVISING
• James Cardillo: MS in Mechanical Engineering, Rensselaer Polytechnic Institute (RPI), New York. Graduation: May 2011. Currently Design Engineer at Air Products & Chemicals.
• Gustavo Rivera-Rosario: MS in Mechanical Engineering, RPI. Graduation: December 2011. Currently PhD Candidate at Cornell University.
• Yi Chen: PhD in Aeronautical Engineering, RPI. Graduation: August 2012. Currently Senior CFD Development Engineer at Altair Engineering.
• Can Liu: MS in Mechanical Engineering, Texas Tech University (TTU), Lubbock, Texas. Graduation: October 2013. Currently, PhD student at Texas Tech University.
• Suranga Dharmarathne: PhD in Mechanical Engineering, TTU. Graduation: August 2015. Currently, Postdoctoral Fellow at Texas Tech University.
• Carlos Quinones, MSc in Mechanical Engineering, University of Puerto Rico Mayaguez (UPRM). Expected graduation: May 2018.

UNDERGRAD STUDENT ADVISING
• Jean Santiago (UPRM), Daniel Rodriguez (UPRM), Gabriel Torres (UPRM), Ernie Rivera (UPRM), David Halbritter (TTU) and Jonas Beyene (TTU).

POST-DOCTORAL CO-ADVISING:
• Victor Maldonado: Currently, Assistant Professor at University of Texas San Antonio.

VISITING SCHOLAR ADVISING:
• Muhammad Bilal, PhD Research Fellow - Wind Energy, University of Tromsø, Norway.
• Praju Kiliyanpilakkil, PhD Candidate, Department of Marine, Earth, and Atmospheric Sciences; North Carolina State University, Raleigh, NC, USA.

MEMBERSHIP: AIAA Senior Member, APS, ACM.

PEER REVIEWING ACTIVITIES AND SERVICES:
• Mini-symposium organizer at the 13th World Congress in Computational Mechanics (Title: Spatially-developing turbulent boundary layers), July 22-27, 2018 New York City, USA.
• Workshop organizer (Title: The WRF model: Fundamentals and its Applications) Oct. 31, 2016, U. of Puerto Rico, Mayaguez, PR, USA.
• Technical judging volunteer of student papers, AIAA Region II Student Conference (2016, 2017, 2018)
• Faculty advisor of the UAV Search and Rescue project (AIAA Region II, U. of Puerto Rico, Mayaguez), 2016-2018.
• Session Chair (Theoretical and Fundamental Fluid Dynamics) at AIAA Aviation conference 2016.
• Proposal reviewer at NSF-Fluid Dynamics program (2016, 2017), NASA NSPIRES program (2011) and CONICYT-Chile (2009)
• Reviewer of Nature, Physics of Fluids, Journal of Fluid Mechanics, Int. J. of Heat and Mass Transfer, Computers and Fluids, Journal of Turbulence, Int. J. of Heat and Fluid

Flow, Int. J. of Thermal Sciences, Numerical Heat Transfer, ASME, Applied Mathematical Modelling and Chemical Engineering Communications.

- Mini-symposium organizer at the First Pan American Congress on Computational Mechanics PANACM 2015 (Title: DNS/LES of turbulent wall-bounded flows), April 27-29, 2015 Buenos Aires, Argentina.
- Mini-symposium organizer at the VIII Brazilian Micrometeorology Workshop (Title: The effects of atmospheric parameters on wind power generation), November 20-22, 2013 Santa Maria, RS, Brazil.
- Organizing committee member of Mech Aero-2013, 137th OMICS Group International Conference and Exhibition on Mechanical & Aerospace Engineering: September 30-October 2, 2013 San Antonio, Texas, USA.
- Session Chair at APS-DFD 2010 meeting.

COLLABORATORS AND INTERACTIONS: Prof. K. Jansen (U. of Colorado Boulder), Prof. J. Lugo (UPRM), Prof. S. Leonardi (U. of Texas Dallas), Prof. L. Castillo (TTU), Prof. F. Hussain (TTU), Prof. C. Meneveau (The Johns Hopkins University), Prof. V. Maldonado (U. of Texas San Antonio), Prof. R. Cal (Portland State U.), Prof. O. Hassan (Swansea U., UK), Prof. S. Basu (NCSU), Dr. A. Ruiz-Columbie (TTU) and Prof. Y. Birkelund (UiT, Norway).

PERSONAL SKILLS
Computer Software and Language: Parallel Computing MPI, FORTRAN90/95, scientific visualization tools (Paraview, Visitl, Tecplot, Maya), C, C++, unix/linux, Fluent, CCM+, Latex, AutoCAD, Microsoft Office, MATLAB, Moodle.
Language: Advanced level in English, native Spanish speaker.

REFERENCES UPON REQUEST