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Updated, February 2015.

OSCAR FLORES, PhD.

EDUCATION

- Mar 2008 PhD in Aeronautical Engineering. ETSIA, U. Politécnica de Madrid, Spain.
PhD Thesis: “The dynamics of the outer region of wall-bounded turbulence”
- Sep 2002 MSc/Bc in Aeronautical Engineering. ETSIA, U. Politécnica de Madrid, Spain.
MSc Thesis: “Design of a simulation of the wall region in a turbulent flow”.

PROFESSIONAL EXPERIENCE

- 2011-present **Visiting Professor** at the Department of Bioengineering and Aerospace Engineering, Universidad Carlos III de Madrid.
Served as **Vice-chair** of the Department from Jan 2012 to Jan 2013.
Serving as **Academic Assistant Director** of the School of Engineering from Feb 2015.
- 2008-2011 **Research Associate.** Department of Mechanical Engineering. University of Washington.
May 2010: Consultant for NOAA.
Sep 2010: Linné Flow visitor at the Linné Flow Center in KTH, Stockholm (Sweden).
- 2002-2008 **Graduate Research Fellow.** School of Aeronautics. Universidad Politécnica de Madrid.
2003-2008: Consultant for Englobe Technologies.
2003-2004: Translator of the book “Fluid Mechanics, 5th Edition”, by Frank M. White. McGraw Hill Interamericana de España, Barcelona, Spain.
Sep. 2006: Visiting Research Fellow. Department of Mechanical Engineering. University of Texas at Austin.
Aug. 2003: Visiting Research Fellow. Center for Turbulence Research. Stanford University.

HONORS, AWARDS & FELLOWSHIPS

- Nov 2010 U.S. Geological Survey Director’s Award.
- Nov 2008 Finalist of the ERCOFTAC Da Vinci Competition 2008.
- 2003-2008 PhD Scholarship from “Programa Nacional de Formación de Personal Investigador”. Spanish Ministry of Education.
- 2001-2002 Undergraduate Scholarship “Beca de colaboración de la U. Politécnica de Madrid”.

ARTICLES IN REFEREED JOURNALS (Times cited: 187, h-index=6)

1. ANTORANZ, A., GONZALO, A., GARCÍA-VILLALBA, M. & FLORES, O. “Numerical simulation of heat transfer in a pipe with asymmetric thermal boundary conditions”, 2015. Submitted to the *Int. J. Heat and Fluid Flow*.
2. ETIEL-AMOR, G., ORLU, R. SCHLATTER, P. & FLORES, O. ,2015 “Hairpin vortices in turbulent boundary layers”. *Phys. Fluids*. **27** (2), 025108. **Times cited: 0**
3. LOZANO-DURÁN, A, FLORES, O. & JIMÉNEZ, J, 2012 “The structure of the momentum transfer on wall-bounded turbulence”. *J. Fluid Mech.* **694**, 100-130. **Times cited: 16**
4. FLORES, O. & RILEY, J. 2011 “Analysis of turbulence collapse in the stably stratified surface layer using direct numerical simulation”. *Boundary-Layer Meteorol.* **139**, 2, 241–259. 10.1007/s10546-011-9588-2. **Times cited: 10**
5. FLORES, O. & JIMÉNEZ, J. 2010 “Hierarchy of minimal flow units in the logarithmic layer”. *Phys. Fluids* **22**, 071704. **Times cited: 23**
6. FLORES, O., JIMÉNEZ, J. & DEL ÁLAMO, J.C., 2007 “Vorticity organization in the outer layer of turbulent channels with disturbed walls”. *J. Fluid Mech.* **591**, 145–154. **Times cited: 23**
7. FLORES, O. & JIMÉNEZ, J., 2006 “Effect of wall-boundary disturbances on turbulent channel flows”. *J. Fluid Mech.* **566**, 357–376. **Times cited: 42**
8. JIMÉNEZ J., DEL ÁLAMO, J.C. & FLORES, O., 2004 “The large-scale dynamics of near-wall turbulence”. *J. Fluid Mech.* **505**, 179–199. **Times cited: 73**

CONFERENCE PAPERS AND TECHNICAL REPORTS

1. FLORES, O., MARUGAN-CRUZ, C., SANTANA, D., & GARCIA-VILLALBA, M. 2014. “Thermal Stresses Analysis of a circular tube in a Central Receiver”. Energy Procedia, SOLAR PACES 2013. doi 10.1016/j.egypro.2014.03.038
2. D’ADDIO, P., SASSUN, D., FLORES, O. & ORLANDI, P. 2014. “Influence of solid boundary conditions on the evolution of free and wall-bounded turbulent flows”. Journal of Physics: Conference Series. **506**, 012014
3. ETIEL-AMOR, G., FLORES, O. & SCHLATTER, P. 2014. “Hairpin vortices in turbulent boundary layers”. Journal of Physics: Conference Series. **506**, 012008
4. FLORES, O., & JIMÉNEZ, J., 2010. “Log-layer dynamics in smooth and artificially-rough turbulent channels”. *IUTAM Symposium on The Physics of Wall-Bounded Turbulent Flows on Rough Walls*, Cambridge, UK, July 7-9, 2009. T.B. Nickels (Ed.). IUTAM Bookseries, Vol 22.
5. FLORES, O. & JIMÉNEZ, J., 2004. “Effect of wall-boundary disturbances on turbulent channel flows”. *Advances in turbulence X*, CIMNE, 235-238.

6. FLORES, O., JIMÉNEZ, J. & TEMPLETON, J., 2003. “Rough wall channel analysis using suboptimal control theory”. *CTR Annual Research Briefs*, 413–424, Stanford University.
7. JIMÉNEZ, J, DEL ÁLAMO, J.C. & FLORES, O. 2002. “The structure of wall-bounded turbulence”. *Proceedings of the Int. Symposium on Dynamics of Coherent Structures in Turbulence*, Tokyo, Japan, October 21-32. S. Kida (ed.). 37-48.
8. JIMÉNEZ, J, DEL ÁLAMO, J.C. & FLORES, O. 2002. “Large-scale organization of the turbulent wall region”. *IUTAM Symp. on high Reynolds number Flows*, Princeton, US, September 11-13, 2002. A. Smits (ed.).
9. JIMÉNEZ, J., FLORES, O. & GARCÍA-VILLALBA, M. 2002. “Organization of autonomous wall turbulence”. *Advances in turbulence IX*, CIMNE, 824-828.
10. JIMÉNEZ, J., FLORES, O. & GARCÍA-VILLALBA, M. 2001. “The large scale organization of autonomous turbulent wall regions”. *CTR Annual Research Briefs*, Stanford, CA. 317-329.

INVITED LECTURES

1. “Direct Numerical Simulation of turbulent stably-stratified wall flows”. Workshop on Simulation of complex flows: large scale DNS and LES of gaseous and two-phase flows. ETSIA, U. Politécnica de Madrid (Spain). April 2012.
2. “Analysis of stratification effects on the atmospheric surface layer using DNS”. ETSIA, U. Politécnica de Madrid (Spain). September 2010.
3. “DNS of wall-bounded turbulence”. Universidad Carlos III de Madrid (Spain). September 2010.
4. “Analysis of stable stratification effects on the atmosphere using DNS”. Linné Flow Center in KTH, Stockholm (Sweden). September 2010.
5. “DNS of turbulent channels with stable stratification”. Northwest Research, Seattle, WA (US). June 2010.
6. “Analysis of turbulence collapse in stably stratified surface layers using direct numerical simulation”. NCAR, Mesoscale and Microscale Meteorology Division, Boulder, CO (US). June 2010.
7. “DNS of turbulent channels with stable stratification”. Fluid Mechanics Seminars, MAE Department, UCSD (San Diego, CA). April 2010.

PARTICIPATION IN CONFERENCES

1. A. ANTORANZ, A. GONZALO, O. FLORES and M. GARCÍA-VILLALBA. “Turbulent heat transfer in pipe flow with asymmetric thermal boundary conditions”. European Turbulence Modelling and Measurements 10, Marbella, September 2014.

2. A. ANTORANZ, A. GONZALO, O. FLORES and M. GARCÍA-VILLALBA. “Turbulent heat transfer in pipes with variable circumferential heat flux”. European Fluid Mechanics Conference 10, Technical University of Denmark, Lyngby September 2014.
3. M. MORICHE, O. FLORES and M. GARCÍA-VILLALBA. “Flapping Airfoil Simulations at Very Low Reynolds”. European Fluid Mechanics Conference 10, Technical University of Denmark, Lyngby September 2014.
4. A.E. ALMAGRO, O. FLORES and M. GARCÍA-VILLALBA. “Direct Numerical Simulation of a turbulent mixing layer with variable density”. European Fluid Mechanics Conference 10, Technical University of Denmark, Lyngby September 2014.
5. M. MORICHE, O. FLORES & M. GARCÍA-VILLALBA. “Generation of thrust and lift with airfoils in plunging and pitching motion”. 3rd International Conference on Mathematical Modeling in Physical Sciences (IC-MSQUARE 3), Madrid, August 28-31, 2014.
6. J. RILEY, S. DE BRUYN KOPS and O. FLORES. “On the analogies between stratified turbulence, near free surface turbulence and thin layer turbulence”. Fundamental aspects of Geophysical Turbulence, Nahgoya, Japon. March 2014.
7. G. ETIEL-AMOR, O. FLORES, R. ÖRLÜ, P. SCHLATTER. “On the hairpin vortex conundrum”. Interdisciplinary Turbulence Initiative (iT_i 2014), Bertinoro (FC), Italy. September 2014.
8. O. FLORES, M. GARCÍA-VILLALBA, C. MARUGÁN-CRUZ and D. SANTANA. “Thermal Stresses Analysis of a Circular Tube in Central Receiver”. Solar Paces, **poster**, Las Vegas, US. September 2013.
9. O. FLORES and M. GARCÍA-VILLALBA. “Effect of thermal boundary condition on wall-bounded, stably-stratified turbulence”. Annual Meeting of the Division of Fluid Dynamics of the American Physical Society, **G21.7**, San Diego, US. November 2012.
10. A. ABDILGHANIE, J. RILEY, O. FLORES and R. MOSER. “A novel methodology for simulating low-Mach number combustion”. Annual Meeting of the Division of Fluid Dynamics of the American Physical Society, **H26.1**, San Diego, US. November 2012.
11. J. RILEY, O. FLORES and A. HORNER-DEVINE. “On the dynamics of homogeneous turbulence near a stress-free surface”. International Congress of Theoretical and Applied Mechanics **FM09-021, invited lecture**. Beijing, China. August 2012.
12. O. FLORES and J. RILEY. “On the dynamics of homogeneous turbulence near a surface”. Annual Meeting of the Division of Fluid Dynamics of the American Physical Society, **M-1**, Baltimore, US. November 2011.
13. A. LOZANO-DURAÁN, O. FLORES and J. JIMÉNEZ. “Three-dimensional structure of momentum transfer in turbulent channels”. Annual Meeting of the Division of Fluid Dynamics of the American Physical Society, **L-7**, Baltimore, US. November 2011.
14. O. FLORES and J. RILEY. “Energy balance in stably-stratified, wall-bounded turbulence.”. 7th International Symposium on Stratified Flows, Rome, Italy. August 2011.

15. O. FLORES, J. RILEY, N. MALAYA and R. MOSER. "Stable stratification in turbulent Ekman layers". Annual Meeting of the Division of Fluid Dynamics of the American Physical Society, **HG-5**, Long Beach, US. November 2010.
16. J. RILEY, V. VASAN, O. FLORES and P.K. YEUNG. "On spectral energy transfer in strongly stratified flows". Annual Meeting of the Division of Fluid Dynamics of the American Physical Society, **PS-2**, Minneapolis, US. November 2009.
17. O. FLORES and J. RILEY. "DNS of stably stratified open channel flow". Annual Meeting of the Division of Fluid Dynamics of the American Physical Society, **BS-2**, Minneapolis, US. November 2009.
18. O. FLORES and J. JIMÉNEZ. "The effect of artificial roughness on the outer region of turbulent channels". IUTAM Symposium on The Physics of Wall-Bounded Turbulent Flows on Rough Walls. Cambridge, UK. July 7-9, 2009.
19. O. FLORES and J. JIMÉNEZ. "The structures of the momentum transfer in turbulent channels". Annual Meeting of the Division of Fluid Dynamics of the American Physical Society, **PA-8**, San Antonio, US. November 2008.
20. O. FLORES and J. JIMÉNEZ. "The minimal logarithmic region". Annual Meeting of the Division of Fluid Dynamics of the American Physical Society, **AE-4**, Salt Lake City, US. November 2007.
21. O. FLORES and J. JIMÉNEZ. "Self-similar vortex clusters over rough walls". Annual Meeting of the Division of Fluid Dynamics of the American Physical Society, **AL-9**, Tampa, US. Nov. 2006.
22. O. FLORES and J. JIMÉNEZ. "Dynamics of turbulent structures in the log layer". Annual Meeting of the Division of Fluid Dynamics of the American Physical Society, **LR-1**, Chicago, US. November 2005.
23. O. FLORES and J. JIMÉNEZ. "DNS of turbulent channel with simulated wall-roughness". ITP meeting at the School of Aeronautics (UPM), Madrid, Spain. June 2005.
24. O. FLORES and J. JIMÉNEZ. "Effect of wall-boundary disturbances on turbulent channel flows". X European Turbulence Conference, Trondheim, Norway. July 2004.
25. O. FLORES and J. JIMÉNEZ. "Effect of perturbed wall boundary conditions on turbulent channels". Annual Meeting of the Division of Fluid Dynamics of the American Physical Society, New Jersey, US. November 2003.
26. O. FLORES and J. JIMÉNEZ. "Large-scale dynamics of near-wall turbulence". Annual Meeting of the Division of Fluid Dynamics of the American Physical Society, Dallas, US. November 2002.
27. O. FLORES and J. JIMÉNEZ. "Organization of autonomous wall turbulence". IX European Turbulence Conference, Southampton, England. July 2002.
28. J. JIMÉNEZ, O. FLORES and M. GARCÍA-VILLALBA. "The large scale organization of turbulent walls", Annual Meeting of the Division of Fluid Dynamics of the American Physical Society, San Diego, US. November 2001.

RESEARCH SUPPORT

Ongoing

1. Numerical and Experimental investigation of the unsteady aerodynamics of flapping wings. TRA2013-41103-P
Funding Agency: Spanish Ministry of Economy and Competitivity
Period: 2014- 2016
PI: M. García-Villalba and O. Flores
Aims: Understand the effect of the different kinematical parameters of wing flapping in the unsteady aerodynamic forces. The project proposes a mix of experiments and simulations, to explore a wide range of Reynolds numbers and kinematic configurations. The objective is to generate low-order aerodynamic models that can be used to design micro air vehicles (MAVs).
2. SCORE: Sustainable Combustion Research. 2010/00597/001
Funding Agency: Spanish Ministry of Science and Innovation
Period: 2010 - 2015
PI: A. Sánchez
Aims: Development of advanced and sustainable combustion systems via the use and improvement of predictive tools, experimental techniques, as well as measurement methods and control.
Role: Researcher

Completed (last 3 years)

1. Unsteady Aerodynamics of Flapping Wings. TRA2012-37714
Funding Agency: Spanish Ministry of Economy and Competitivity
Period: 2013 - 2014
PI: O. Flores
Aims: Improve our understanding and prediction capabilities of the flow dynamics of flapping wings at low Reynolds numbers. Characterize the effect of small asymmetries on the flapping motion of the wing, and evaluate their potential to implement control and maneuverability strategies for micro-air vehicles.
2. Computational Fluid Mechanics and Turbulence Modeling. 2012/00395/001
Funding Agency: Acciona Wind Power
Period: 2012-2012
PI: W. Coenen
Aims: Knowledge transfer from the UC3M to Acciona WindPower.
Role: Co-PI.
3. Collaborative research: Enabling Discovery in High Reynolds number Turbulence via Advance Tools for Petascale Simulation and Analysis. OCI - 0749209
Funding Agency: National Science Foundation
Period: 2007 - 2012
PI: J. Riley
Aims: Development of highly parallel codes for turbulence simulation, with special emphasis in low-Mach number formulations of the Navier-Stokes equations.
Role: Researcher

4. Direct Numerical Simulation of Very Stable Atmospheric Boundary Layers, W911NF-08-1-0155
Funding Agency: Army Research Office
Period: 2008 - 2011
PI: J. Riley
Aims: Analyze the effect of stable stratification of the atmospheric boundary layer, focussing on very stable nights, where the strong ground cooling yields strong damping of the buffer-layer turbulent motions.
Role: Researcher
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MENTORING

PhD Students

1. M. Moriche. “Unsteady aerodynamics of flapping wings”, UC3M.
Co-directed with M. García-Villalba (UC3M). Expected 2015.
2. A. Almagro. “Direct numerical simulation of vaporisation and diffusion-controlled combustion of fuel sprays”, UC3M.
Co-directed with A. Sánchez & M. García-Villalba (UC3M). Expected 2015.
3. A. Antoranz. “Heat transfer in turbulent flow in pipes”, UC3M.
Co-directed with M. García-Villalba (UC3M). Expected 2016.
4. A. Gonzalo. “A numerical study of the unsteady effects on external aerodynamics”, UC3M.
Co-directed with M. García-Villalba (UC3M). Expected 2016.

Master Students

1. E. Hernández-Hurtado. “Inertial effects on the performance of flapping wings”, UC3M.
Co-directed with M. García-Villalba (UC3M). Expected 2016.
2. A. Gonzalo. “Numerical simulation of a turbulent flow in a pipe with variable density”, UC3M.
Co-directed with M. García-Villalba (UC3M). Graduated September 2013.
3. C. Cortega. “Design and manufacturing of a demonstration hybrid rocket”, UC3M.
Co-directed with M. García-Villalba (UC3M). Graduated on June 2013.
4. R. de la Iglesia. “Calibration of a 6-axis load cell”, UC3M.
Graduated on May 2013.
5. S. Izquierdo. “Towards the numerical simulation of the filling process of the left ventricle of heart”, UC3M. Co-directed with J. C. del Álamo (UCSD) and J. Rodríguez (UC3M). Graduated on Nov 2010.

TEACHING

Undergraduate Courses.

1. Advanced Aerodynamics (Bs. Aerospace Engineering, UC3M). Fall 2013, Fall 2014
2. Aerodynamics (Bs. Aerospace Engineering, UC3M). Fall 2012, Fall 2013, Fall 2014

Graduate Courses.

1. Turbulence (Ms. in Industrial Mathematics, UC3M, UPM, USC, UV). Winter 2015.
2. Advanced Numerical Seminar (Ms. Industrial Mathematics, UC3M). Fall 2011, Fall 2012.
3. Modeling in Science and Industry II (Ms. Industrial Mathematics, UC3M). Winter 2012.
4. Fundamentals of Aeronautical Engineering (Master of Aircraft System Integration, UC3M). Spring 2012, Spring 2013.

SERVICE

Peer-Review

-**ANEP Reviewer**, since 2014.

-**Journal Referee** for the Journal of Fluid Mechanics, PLOS-ONE, Physics of Fluids, Journal of Turbulence, Experimental Thermal and Fluid Science and Journal of Atmospheric Sciences.

Conference/Symposium Organization:

-Member of the local arrangements committee for the *10th International ERCOFTAC Symposium on Engineering Turbulence Modeling and Measurements* (Sep 2014).

Outreach activities:

-Lecture at the high-school *IES Leonardo da Vinci-Majadahonda*, during the XI edition of the Science Week in Madrid (Nov 2011).