Manuel García-Villalba

CONTACT INFORMATION

Bioeng. and Aerospace Eng. Dept.
Universidad Carlos III de Madrid
Avda. de la Universidad 30
Leganés, 28911, Spain

Phone: +34-91-624-8218
E-mail: manuel.garcia-villalba@uc3m.es

EDUCATION

University of Karlsruhe, Karlsruhe, Germany

Dr.-Ing., Mechanical Engineering **Feb. 2006**

Universidad Politécnica de Madrid, Madrid, Spain

Aeronautical Engineering **Sept. 2000**

PROFESSIONAL EXPERIENCE

Universidad Carlos III de Madrid, Leganés, Spain

Associate Professor **Apr. 2016 to present**

Assistant Professor **Oct. 2010 to Apr. 2016**

University of California San Diego, San Diego, USA

Visiting Professor **Sept. 2017 to May. 2018**

Karlsruhe Institute of Technology, (formerly University of Karlsruhe), Karlsruhe, Germany

DFG Mercator Fellow **May 2018 to April 2020**

Visiting Scientist **May 2015 to July 2015**

Research Assistant and Lecturer **Sept. 2007 to Sept. 2010**

Research Assistant **Apr. 2002 to Sept. 2007**

Airbus Spain, Getafe, Spain

Project Engineer **Apr. 2001 to Apr. 2002**

Iberespacio, Madrid, Spain

Project Engineer **Dec. 2000 to Apr. 2001**

REFEREED JOURNAL PUBLICATIONS

[1] A. Gonzalo, G. Arranz, M. Moriche, M. García-Villalba and O. Flores. From flapping to heaving: a numerical study of wings in forward flight. *J. Fluids Struct.*, **83**, 293–309, 2018

[2] G. Arranz, M. Moriche, M. Uhlmann, O. Flores and M. García-Villalba. Kinematics and dynamics of the auto-rotation of a model winged seed. *Bioinspir. Biomim.*, **13**, 036011, 2018

[3] G. Arranz, A. Gonzalo, M. Uhlmann, O. Flores and M. García-Villalba. A numerical study of the flow around a model winged seed in auto-rotation. *Flow, Turbul. Combust.*, **101** (2), 477–497, 2018

[4] M. Moriche, E. Hernández-Hurtado, O. Flores and M. García-Villalba Numerical simulation of the flow around a flapping-wing micro air vehicle in free flight. *In press. Proc. Inst. Mech. Eng. G J. Aerospace Eng.*, 2018

[5] I. J. Moncho-Esteve, M. García-Villalba, Y. Muto, K. Shiono and G. Palau-Salvador. A numerical study of the complex flow structure in compound meandering channels. *Adv. Water Resour.*, **116**, 95–116, 2018.

[6] A. Antoranz, A. Ianiro, O. Flores and M. García-Villalba. Extended proper orthogonal decomposition of non-homogeneous thermal fields in a turbulent pipe flow. *Int. J. Heat Mass Transfer*, **118**, 1264–1275, 2018

[7] A. Almagro, M. García-Villalba and O. Flores. A numerical study of a variable-density low-speed turbulent mixing layer. *J. Fluid Mech.*, **830**, 569–601, 2017.

[8] M. Moriche, O. Flores and M. García-Villalba. On the aerodynamic forces on heaving and pitching airfoils at low Reynolds number. *J. Fluid Mech.*, **828**, 395–423, 2017.

[9] G. Sánchez-Arriaga, M. García-Villalba and R. Schmehl. Modeling and dynamics of a two-line kite. *Appl. Math. Model.*, **47C**, 473–486, 2017.

[10] I. J. Moncho-Esteve, F. Folke, M. García-Villalba and G. Palau-Salvador. Influence of the secondary motions on pollutant mixing in a meandering open channel flow. *Environ. Fluid Mech.*, **17**, 695–714, 2017.

[11] M. Moriche, O. Flores and M. García-Villalba. Three-dimensional instabilities in the wake of a flapping wing at low Reynolds number. *Int. J. Heat Fluid Flow*, **62**, 44–55, 2016.

[12] C. Marugán-Cruz, O. Flores, D. Santana, M. García-Villalba. Heat transfer and thermal stresses in a circular tube with a non-uniform heat flux. *Int. J. Heat Mass Transfer*, **96**, 256–266, 2016.

[13] A. Antoranz, A. Gonzalo, O. Flores and M. García-Villalba. Numerical simulation of heat transfer in a pipe with non-homogeneous thermal boundary conditions. *Int. J. Heat Fluid Flow*, **55**, 45–51, 2015.

[14] M. García-Villalba, G. Palau-Salvador and W. Rodi. Forced convection heat transfer from a finite-height cylinder. *Flow, Turbul. Combust.*, **93**(1),171–187, 2014.

[15] W. Brevis, M. García-Villalba and Y. Niño. Experimental and large eddy simulation study of the flow developed by a sequence of lateral obstacles. *Environ. Fluid Mech.*, **14**(4),873–893, 2014.

[16] C. Chan-Braun, M. García-Villalba and M. Uhlmann. Spatial and temporal scales of force and torque acting on wall-mounted spherical particles in open channel flow. *Phys. Fluids*, **25**, 075103, 2013.

[17] M. García-Villalba, A.G. Kidanemariam and M. Uhlmann. DNS of vertical plane channel flow with finite size particles: Voronoi analysis, acceleration statistics and particle-conditioned averaging. *Int. J. Multiphase Flow*, **46**, p. 54-74, 2012.

[18] C. Chan-Braun, M. García-Villalba and M. Uhlmann. Force and torque acting on particles in a rough wall open channel flow. *J. Fluid Mech.*, **684**, p. 441-474, 2011.

[19] M. García-Villalba and J.C. del Álamo. Turbulence modification by stable stratification in channel flow. *Phys. Fluids,* **23**, 045104, 2011

[20] W. Brevis and M. García-Villalba. Shallow-flow visualization analysis by proper orthogonal decomposition. *J. Hydraul. Res.*, **49**(5), p. 586-594, 2011.

[21] G. Palau-Salvador, M. García-Villalba, and W. Rodi. Scalar transport from point sources in the flow around a finite-height cylinder. *Environ. Fluid Mech.*,**11** p. 611-625, 2011.

[22] M. García-Villalba, J.G. Wissink and W. Rodi. Influence of the approach boundary layer on the flow over an axisymmetric hill at a moderate Reynolds number. *J. Turbul.*, **11**, N8, 2010.

[23] M. García-Villalba, N. Li, W. Rodi and M.A. Leschziner. Large eddy simulation of separated flow over a three-dimensional axisymmetric hill. *J. Fluid Mech.*, **627**, p. 55-96, 2009.

[24] G. Pujals, M. García-Villalba, C. Cossu and S. Depardon. A note on optimal transient growth in turbulent channel flows. *Phys. Fluids,* **21**, 015109, 2009

[25] T. Stoesser, C. Braun, M. García-Villalba, and W. Rodi. Turbulence structures in flow over two-dimensional dunes. *J. Hydraul. Eng.*, **134**, p. 42-55, 2008.

[26] J. Fröhlich, M. García-Villalba, and W. Rodi. Scalar mixing and large–scale coherent structures in a turbulent swirling jet. *Flow, Turbul. Combust.*, **80**, p. 47-59, 2008.

[27] M. García-Villalba, J. Fröhlich, and W. Rodi. Numerical simulations of isothermal flow in a swirl burner. *J. Eng. Gas Turbines Power*, **129**, p. 377-386, 2007.

[28] M. García-Villalba, J. Fröhlich, and W. Rodi. Identification and analysis of coherent structures in the near field of a turbulent unconfined annular swirling jet using large eddy simulation. *Phys. Fluids,* **18**, 055103, 2006

[29] M. García-Villalba and J. Fröhlich. LES of a free annular swirling jet – dependence of coherent structures on a pilot jet and the level of swirl. *Int. J. Heat Fluid Flow*, **27**, p. 911-923, 2006.

PROCEEDINGS

[30] M. Moriche, A. Gonzalo, O. Flores and M. García-Villalba. Fast transverse maneuvers at low Reynolds numbers. Accepted, *AIAA SciTech*, San DIego, USA, 2019

[31] A. Gonzalo, G. Arranz, M. Moriche, O. Flores and M. García-Villalba. A numerical study of low-aspect-ratio flapping-wings in forward flight. *ERCOFTAC Workshop Direct and Large Eddy Simulation 11*, Pisa, Italy, 2017.

[32] G. Arranz, M. Moriche, M. Uhlmann, O. Flores and M. García-Villalba. The influence of the Reynolds number on the autorotation of samara seeds. *ERCOFTAC Workshop Direct and Large Eddy Simulation 11*, Pisa, Italy, 2017.

[33] M. Moriche, E. Hernández-Hurtado, O. Flores and M. García-Villalba Numerical simulation of the flow around a flapping-wing micro air vehicle in free flight. *7th European Conference for Aeronautics and Space Sciences*, Milano, Italy, 2017.

[34] A. Antoranz, A. Gonzalo, O. Flores and M. García-Villalba. Turbulent heat transfer in pipe flow with asymmetric thermal boundary conditions. *Engineering Turbulence Modelling and Experiments 10*, Marbella, Spain, 2014.

[35] O. Flores, C. Marugán-Cruz, D. Santana and M. García-Villalba Thermal Stresses Analysis of a Circular Tube in Central Receiver. *Energy Procedia*, **49C**, p. 354-362, 2014. *SolarPACES 2013*, Las Vegas, USA, Sept 17-20, 2013.

[36] M. García-Villalba, E. Azagra and M. Uhlmann. Mixing efficiency in stably-stratified plane Couette flow. 7^{th} *Int. Symp. on Stratified Flows, Rome, Italy*, August 22-26,2011.

[37] C. Chan-Braun, M. García-Villalba and M. Uhlmann. Direct numerical simulation of rough wall open channel flow *Proc. 7th Int. Symposium on Turbulence and Shear Flow Phenomena. Ottawa. Canada*, 2011.

[38] M. García-Villalba, E. Azagra and M. Uhlmann. A numerical study of turbulent stably-stratified Couette flow. *High Performance Computing in Science and Engineering '10*, 2010.

[39] C. Chan-Braun, M. García-Villalba and M. Uhlmann. Direct numerical simulation of sediment transport in turbulent open channel flow. *High Performance Computing in Science and Engineering '10*, 2010.

[40] C. Chan-Braun, M. García-Villalba and M. Uhlmann. Numerical simulation of fully resolved particles in rough-wall turbulent open channel flow. *7th International Conference on Multiphase Flow. Tampa, Fl., USA*, 2010.

[41] C. Braun, M. García-Villalba and M. Uhlmann. A computational study of the hydrodynamic forces on a rough wall. *12th European Turbulence Conference. Marburg. Germany*, 2009.

[42] F. Folke, I. Moncho-Esteve, M. García-Villalba, C. Braun, and G.Palau-Salvador. Lateral mixing in a meandering open channel flow. *Int. Workshop on Environmental Hydraulics. Valencia. Spain*, 2009.

[43] M. García-Villalba and W. Brevis. A numerical study of flow in emerged and submerged groynes. *Int. Workshop on Environmental Hydraulics. Valencia. Spain*, 2009.

[44] F. Folke, I. Moncho-Esteve, M. García-Villalba, C. Braun, and G.Palau-Salvador. Large Eddy Simulation of flow in meandering open channels. *33rd IAHR Congress: Water engineering for a sustainable environment. Vancouver. Canada*, 2009.

[45] C. Braun, M. García-Villalba and M. Uhlmann. Particle force generation in a turbulent open channel flow. *33rd IAHR Congress: Water engineering for a sustainable environment. Vancouver. Canada*, 2009.

[46] M. García-Villalba and J.C. del Álamo. Turbulence and internal waves in a stably-stratified channel flow. *High Performance Computing in Science and Engineering '08*, W. E. Nagel et al. (eds.), Springer, 217-227, 2008.

[47] M. García-Villalba, T. Stoesser, D. von Terzi, J.G. Wissink, J. Fröhlich, and W. Rodi. Large eddy simulation of turbulent separated flow over a three-dimensional hill. *11th European Turbulence Conference. Porto. Portugal*, 2007.

[48] M. García-Villalba and W. Rodi. Investigation of the turbulent flow separation from an axisymmetric hill. *High Performance Computing in Science and Engineering '07*, W. E. Nagel et al. (eds.), Springer, 409-418, 2007.

[49] M. García-Villalba, J. Fröhlich, and W. Rodi. Investigation of the influence of the inlet geometry on the flow in a swirl burner. *High Performance Computing in Science and Engineering '06*, W. E. Nagel et al. (eds.), Springer, 381-390, 2006.

[50] J. Fröhlich, M. García-Villalba, and W. Rodi. On the impact of large–scale coherent structures on scalar mixing in swirling jets. *Conf. Turbulence and Interactions TI2006. Porquerolles. France*, 2006.

[51] M. García-Villalba, J. Fröhlich, and W. Rodi. Numerical simulation of isothermal flow in a swirl burner. *ASME GT2006-90764. ASME Turbo Expo 2006: Power for Land, Sea and Air. Barcelona. Spain*, 2006.

[52] M. García-Villalba, J. Fröhlich, W. Rodi, O. Petsch, and H. Büchner. Large eddy simulation of flow instabilities in co-annular swirling jets. In *Proc. 6th Direct and Large Eddy Simulation Workshop. Poitiers. France*, 2005.

[53] M. García-Villalba, J. Fröhlich, and W. Rodi. Large eddy simulation of an annular swirling jet with pulsating inflow. In *Proc. 4th Int. Symposium on Turbulence and Shear Flow Phenomena. Williamsburg. USA*, 2005.

[54] M. García-Villalba and J. Fröhlich. On the sensitivity of a free annular swirling jet to the level of swirl and a pilot jet. In W. Rodi and M. Mulas, editors, *Engineering Turbulence Modelling and Experiments 6*, pages 845–854, 2005.

[55] M. García-Villalba, J. Fröhlich, and W. Rodi. On inflow boundary conditions for large eddy simulation of turbulent swirling jets. In *Proc. 21st Int. Congress of Theoretical and Applied Mechanics. Warsaw. Poland*, 2004.

[56] M. García-Villalba, J. Fröhlich, and W. Rodi. Unsteady phenomena in an unconfined annular swirling jet. In H.I. Andersson and P.Å. Krogstad, editors, *Advances in Turbulence X*, pages 515–518, 2004.

[57] C. Hinterberger, M. García-Villalba, and W. Rodi. LES of flow around the Ahmed body. In R. McCallen, F. Browand, and J. Ross, editors, *Lecture Notes in Applied Mechanics and Computational Mechanics / The Aerodynamics of Heavy Vehicles: Trucks, Buses, and Trains*. Springer Verlag, 2004.

[58] J. Jiménez, O. Flores, and M. García-Villalba. Organization of autonomous wall turbulence. In I.P. Castro, P.E. Hancock, and T.G. Thomas, editors, *Advances in Turbulence IX*, pages 825–828, 2002.

OTHER PUBLICATIONS AND CONFERENCE CONTRIBUTIONS

[59] M. García-Villalba, L. Rossini, A. Gonzalo, D. Vigneault, A. M. Kahn, O. Flores, E. McVeigh, J. C. del Álamo. Patient-specific mapping of left atrial thrombosis risk by computational fluid dynamics. *American Heart Association's Scientific Sessions 2018* , Chicago, USA, 2018

[60] O. Flores, L. Rossini, A. Gonzalo, D. Vigneault, A. M. Kahn, M. García-Villalba, E. McVeigh, J. C. del Álamo. Evaluation of blood-stasis in the left atrium using patient-specific CFD. Submitted to *APS Division Fluid Mechanics Annual Meeting*, Atlanta, USA, 2018

[61] G. Arranz, A. Gonzalo, M. Moriche, M. Uhlmann, O. Flores and M. García-Villalba. On the stabilization of the leading edge vortex of an auto-rotating winged seed. Submitted to *APS Division Fluid Mechanics Annual Meeting*, Atlanta, USA, 2018

[62] G. Arranz, M. Uhlmann, M. García-Villalba and O. Flores. Characterization of the flow around an auto-rotating winged seed. *12th European Fluid Mechanics Conference*, Vienna, Austria, 2018.

[63] A.G. Kidanemariam, M. Scherer, M. Moriche, M. García-Villalba and M. Uhlmann. Turbulent flow over two-dimensional subaequeous bedforms: A comparison between stationary and evolving dunes. *12th European Fluid Mechanics Conference*, Vienna, Austria, 2018.

[64] A. Antoranz, O. Flores and M. García-Villalba. Temperature-dependent fluid properties in a turbulent pipe with circumferentially varying thermal boundary conditions. *12th European Fluid Mechanics Conference*, Vienna, Austria, 2018.

[65] M. García-Villalba, L. Rossini, A. Gonzalo, D. Vigneault, A. M. Kahn, O. Flores, E. McVeigh, J. C. del Álamo. Patient-specific mapping of blood stasis in the left atrium by computational fluid dynamics. *The Heart by Numbers: integrating theory, computation and experiment to advance cardiology*, Berlin, Germany, 2018

[66] M. García-Villalba, A. Antoranz, A. Ianiro and O. Flores. Extended proper orthogonal decomposition of non-homogeneous thermal fields in a turbulent pipe flow. *APS Division Fluid Mechanics Annual Meeting*, Denver, USA, 2017

[67] A. Gonzalo, M. Uhlmann, M. García-Villalba and O. Flores. On the aerodynamic forces of flapping finite-wings in forward flight: a numerical study *APS Division Fluid Mechanics Annual Meeting*, Denver, USA, 2017

[68] G. Sánchez-Arriaga, A. Pastor-Rodríguez, M. García-Villalba, M. Sanjurjo-Rivo, R. Borobia-Moreno and R. Schmehl. Kite flight simulators based on minimal coordinate formulations. *AWEC2017 Airborne Wind Energy Conference*, Breisgau, Germany, 2017

[69] G. Arranz, M. Moriche, M. Uhlmann, O. Flores and M. García-Villalba. Numerical simulation of the auto-rotation of a winged seed. *Challenges in Nonlinear Systems: A meeting to celebrate the 60th birthday of Prof. L.L. Bonilla*, Leganés, Spain, 2017.

[70] A. E. Almagro, M. García-Villalba, O. Flores, A. L. Sánchez. DNS investigation of differential-diffusion effects on temporarily evolving turbulent diffusion flames. *APS Division Fluid Mechanics Annual Meeting*, Portland, USA, 2016

[71] M. Moriche, O. Flores, M. García-Villalba. Decomposing the aerodynamic forces of low-Reynolds flapping airfoils. *APS Division Fluid Mechanics Annual Meeting*, Portland, USA, 2016

[72] O. Flores, A. Gonzalo, M. García-Villalba, L. Rossini, A. Hsiao, E. McVeigh, A. M. Kahn, J. C. del Álamo. Patient-specific analysis of blood stasis in the left atrium. *APS Division Fluid Mechanics Annual Meeting*, Portland, USA, 2016

[73] A. E. Almagro, O. Flores, M. García-Villalba. The effect of fluid properties changing with temperature for a variable density mixing layer. *11th European Fluid Mechanics Conference*, Sevilla, Spain, 2016.

[74] M. Moriche, O. Flores, M. García-Villalba. Analysis of the aerodynamic forces on heaving and pitching airfoils at low Reynolds number. *11th European Fluid Mechanics Conference*, Sevilla, Spain, 2016.

[75] M. Raiola, A. Ianiro, S. Discetti, M. Moriche, O. Flores, M. García-Villalba. Flow over flapping airfoils: qualitative and quantitative comparison between experiments and simulations. *11th European Fluid Mechanics Conference*, Sevilla, Spain, 2016.

[76] A. Gonzalo, O. Flores, M. García-Villalba. A numerical study of finite aspect ratio wings in flapping motion at low Reynolds number. *11th European Fluid Mechanics Conference*, Sevilla, Spain, 2016.

[77] M. Moriche, E. Hernández-Hurtado, O.Flores, M. García-Villalba. The flow around a flapping-wing micro air vehicle in free flight. *11th European Fluid Mechanics Conference*, Sevilla, Spain, 2016.

[78] M. Moriche, M. García-Villalba and O.Flores. Three-dimensional instabilities in the wake of a flapping wing at low Reynolds number. *Int. Conf. Jets, Wakes and Separated Flows (ICJWSF2015)*, Stockholm, Sweden, 2015.

[79] A. E. Almagro, O. Flores and M. García-Villalba. DNS of turbulent mixing layers with variable density. *European Turbulence Conference*, Delft, The Netherlands, 2015.

[80] 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*, Copenhaguen, Denmark, 2014.

[81] M. Moriche, O. Flores and M. García-Villalba. Flapping airfoil simulations at very low Reynolds. *European Fluid Mechanics Conference 10*, Copenhaguen, Denmark, 2014.

[82] 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*, Copenhaguen, Denmark, 2014.

[83] M. Moriche, O. Flores and M. García-Villalba. Generation of thrust and lift with airfoils in plunging and pitching motion *Int. Conf. on Mathematical Modeling in Physical Sciences*, Madrid, Spain, 2014. *J. Phys. Conf. Ser.*, **574**, 012163, 2015.

[84] M. García-Villalba, A.G. Kidanemariam and M. Uhlmann. Some aspects of the interaction between turbulent flow and finite-size particles. *Nonlinear transport, dynamics and fluctuations in condensed matter physics. Sexto encuentro de la red de física de sistemas fuera del equilibrio.* Madrid, 2012.

[85] O. Flores and M. García-Villalba. Effect of thermal boundary condition on wall-bounded, stably-stratified turbulence *APS Division Fluid Mechanics Annual Meeting*, San Diego, 2012

[86] C. Chan-Braun, M. García-Villalba and M. Uhlmann. Characterisation of scales related to force and torque fluctuations on particles in open channel flow *European Fluid Mechanics Conference 9*, Rome, Italy. 2012

[87] J.C. del Álamo, C. Yáñez and M. García-Villalba. Linear analysis of transient growth in stably-stratified, turbulent channel flow *APS Division Fluid Mechanics Annual Meeting*, Baltimore, 2011

[88] M. García-Villalba and J.C. del Álamo. Turbulence modification by stable stratification in channel flow. *APS Division Fluid Mechanics Annual Meeting*, Los Angeles, 2010

[89] W. Brevis, M. García-Villalba and G.H. Jirka. Campos de espigones fluviales: Características de la capa de corte y descripción de la organización del fujo en la región de colisión. *XXIV Congreso Latinoamericano de Hidráulica*. Punta del Este. Uruguay, 2010.

[90] C. Chan-Braun, M. García-Villalba and M. Uhlmann. Numerical simulation of the onset of sediment erosion. *European Fluid Mechanics Conference 8*, Munich, Germany. 2010

[91] M. García-Villalba, E. Azagra and M. Uhlmann. Numerical simulation of stably-stratified Couette flow. *European Fluid Mechanics Conference 8*, Munich, Germany. 2010

[92] C. Chan-Braun, H. Strehle, M. García-Villalba and M. Uhlmann. Direct numerical simulation of sediment erosion in an open channel flow (Movie). *Gallery of Multiphase Flow. 7th International Conference on Multiphase Flow. Tampa, Fl., USA*, 2010.

[93] M. García-Villalba and J.C. del Álamo. Observation of turbulent-laminar patterns in direct numerical simulation of stably-stratified channel flow. *IUTAM Symposium on Laminar-Turbulent Transition. Stockholm. Sweden*, 2009.

[94] M. García-Villalba, C. Yáñez and J.C. del Álamo. Direct numerical simulations and linear analysis of stably-stratified turbulent channel flow from zero to very strong stratification. *IUTAM - Rotating Stratified Turbulence and Turbulence in the Atmosphere and Oceans*, Cambridge, UK, 2008.

[95] C. Braun, M. García-Villalba, M. Uhlmann, G.H. Jirka, and W. Rodi. Impact of turbulent flow on large spherical roughness elements *European Fluid Mechanics Conference 7*, Manchester, UK. 2008

[96] M. García-Villalba and W. Rodi. LES of separated flow past a 3D hill. *GAMM 2008*, Bremen. Germany

[97] M. García-Villalba. Large eddy simulation of turbulent swirling jets. *PhD Thesis*. University of Karlsruhe. 2006

[98] M. García-Villalba, J. Fröhlich, and W. Rodi. Coherent structures in annular and co–annular swirling jets. *European Fluid Mechanics Conference 6*, Stockholm, Sweden. 2006

[99] J. Fröhlich, M. García-Villalba, and W. Rodi. Large Eddy Simulation of swirl flows in annular and co–annular jets. *GAMM 2006*, Berlin. Germany

[100] D. von Terzi, C. Hinterberger, M. García-Villalba, J. Fröhlich, W. Rodi, and I. Mary. LES with downstream RANS for flow over periodic hills and a model combustor flow. In *Proc. Euromech Colloquium 469, LES of Complex Flows. Dresden. Germany*, 2005.

[101] W. Rodi, M. García-Villalba, T. Stoesser, and C. Braun. Flow over an axisymmetric three-dimensional hill (Large Eddy Simulation). In T.G. Johansson and L. Davidson, editors, *Proc. 11th ERCOFTAC/IAHR workshop on refined turbulence modelling*, 2005.

[102] M. García-Villalba, J. Fröhlich, and W. Rodi. Large eddy simulation of turbulent confined coaxial swirling jets. In *PAMM* Vol. 5, Issue 1 , pages 463–464, 2005.

[103] C. Hinterberger, M. García-Villalba, and W. Rodi. Flow around a simplified car body (LES with wall functions). In R. Manceau and J. Bonnet, editors, *Proc. 10th ERCOFTAC(SIG-15)/IAHR/QNET-CFD workshop on refined turbulence modelling*, 2002.

[104] J. Jiménez, O. Flores, and M. García-Villalba. The large-scale organization of autonomous turbulent wall regions. In *Annual Research Briefs*. Center for Turbulence Research. Stanford, 2001.

INVITED TALKS

Bio-inspired aerodynamics: flapping wings and winged seeds. University of California San Diego, USA, October 2017.

Numerical simulation of a variable-density, turbulent mixing layer. Karlsruhe Inst. of Technology, Germany, May 2015.

Simulación numérica de algunos flujos ingenieriles. Universidad de Málaga, Spain, May 2014.

Turbulent open channel flow, sediment erosion and sediment transport. Workshop Numerical Simulation of Turbulent and Complex Flows, Madrid, Spain. April, 2012

Effects of stable stratification on wall-bounded turbulent flows. Technical University of Dresden, Dresden, Germany. September, 2011.

Numerical simulation of some engineering flows. Universidad Carlos III de Madrid, Leganés, Spain. March, 2010.

An investigation of stably-stratified turbulent channel flow. ETSIA, Universidad Politécnica de Madrid, Madrid, Spain. April, 2008.

Técnicas de simulación de flujos turbulentos (DNS y LES). Universidad Politécnica de Valencia, Valencia, Spain. March, 2008.

Coherent structures in annular and co-annular swirling jets. Ciemat, Madrid, Spain. May, 2006.

Coherent structures in annular and co-annular swirling jets. Instituto de Astrofísica de Canarias, La Laguna, Spain. March, 2006.

RESEARCH PROJECTS

Personalized thrombosis risk prediction in patients with atrial fibrillation via computational fluid dynamics and medical imaging. Salvador de Madariaga program. Funded by Spanish Ministry of Education, Culture and Sport (Nov 2017 - Apr 2018)

Forward-flight aerodynamics of a micro air vehicle with two pairs of flapping wings. Funded by Spanish Ministry of Economy and Competitiveness. PI: M. García-Villalba, O. Flores (2017-2019)

Computational study of external aerodynamics of self-propelled bodies. Jose Castillejo program. Funded by Spanish Ministry of Education, Culture and Sport (May 2015 - July 2015)

Computational model of a micro-air vehicle. Funded by BBVA foundation. PI. M. García-Villalba (Dec. 2014 - Nov. 2015)

Numerical and experimental investigation of the unsteady aerodynamics of flapping wings. Funded by Spanish Ministry of Economy and Competitiveness. PI: M. García-Villalba, O. Flores (2014-2016)

Measurement system of 3D flow and heat transfer in a hydrodynamic channel. Funded by Spanish Ministry of Economy and Competitiveness. PI: J. Rodríguez. (2013-2015)

Unsteady aerodynamics of flapping wings. Funded by Spanish Ministry of Economy and Competitiveness. PI: O. Flores (Jan. 2013-Dec. 2013)

Sustained Combustion Research. Funded by Spanish Ministry of Science and Innovation. PI: A. Sánchez (Jan. 2011-Dec. 2016)

High Resolution numerical and experimental studies of turbulence-induced sediment erosion and near bed transport Funded by DFG. PI: G.H. Jirka & M. Uhlmann (July 2009-Sept. 2010)

Large eddy simulation of stratified flow over hills. Funded by DFG. PI: M. García-Villalba (July 2007-June 2009)

Large eddy simulation of flow through and around vegetation. Funded by DFG. PI: W. Rodi (Jan. 2006-Dec. 2006)

Large eddy simulation of oscillating flow in combustion chambers, Collaborative Research Center 606. Funded by DFG. PI: W. Rodi & J. Fröhlich (Jan. 2003-Dec. 2005)

Transnational network on large-eddy simulation of complex industrial flows. Funded by EU. PI: W. Rodi (Apr. 2002-Dec. 2002)

STUDENT SUPERVISION - PHD LEVEL

Cayetano Martínez
Universidad Carlos III de Madrid. Numerical study of aeroelastic effects in flapping wings. Co-supervised with O. Flores. In progress, first year.

Gonzalo Arranz
Universidad Carlos III de Madrid. Control and maneuverability of a flapping wing micro air vehicle. Co-supervised with O. Flores. In progress, second year.

Alejandro Gonzalo
Universidad Carlos III de Madrid. Aerodynamic forces and vortex structures of flapping wings in forward flight. Co-supervised with O. Flores. Nov. 2018.

Antonio Almagro
Universidad Carlos III de Madrid. Direct numerical simulation of reactive and non-reactive turbulent mixing layers. Co-supervised with O. Flores. Dec. 2017.

Antonio Antoranz
Universidad Carlos III de Madrid. A numerical study of turbulent heat transfer in pipes. Co-supervised with O. Flores. Sept. 2017

Manuel Moriche
Universidad Carlos III de Madrid. A numerical study on the aerodynamic forces and the wake stability of flapping flight at low Reynolds number. Co-supervised with O. Flores. Feb. 2017

STUDENT SUPERVISION - MSC LEVEL

Gonzalo Arranz
Universidad Carlos III de Madrid. Numerical simulation of the autorotation of a samara seed. 2017.

Alejandro Gonzalo
Universidad Carlos III de Madrid. Estudio numérico de transferencia de calor en conductos en regimen turbulento. Co-supervised with O. Flores. 2013

Antonio Almagro
Universidad Carlos III de Madrid. Simulación numérica directa de una capa de mezcla turbulenta. Co-supervised with O. Flores. 2013

Manuel Moriche
Universidad Carlos III de Madrid. Development and validation of a numerical solver for unsteady aerodynamics applications. Co-supervised with O. Flores. 2013

Carlos Seisdedos
Universidad Carlos III de Madrid. Diseño y construcción de un motor cohete híbrido. Co-supervised with O. Flores. 2013

Aman G. Kidanemariam
Universität Karlsruhe. Numerical simulation of sediment transport in an open channel flow with fully resolved particles. Co-supervised with M. Uhlmann and C. Chan-Braun. 2010

Elena Azagra
Universität Karlsruhe. Mixing efficiency in stably-stratified turbulent Couette flow. Co-supervised with M. Uhlmann. 2009

Carlos Yáñez
Universität Karlsruhe. Transient development of perturbations in a stratified turbulent shear flow. 2008

Clemens Braun
Universität Karlsruhe. Large-eddy simulation of flow over two-dimensional dunes. Co-supervised with T. Stoesser. 2005

STUDENT SUPERVISION - BSC LEVEL

Roberto Flores Ridao
Universidad Carlos III de Madrid. Numerical simulation of flow over a flapping airfoil. 2016

Blanca Martínez Gallar
Universidad Carlos III de Madrid. Dynamic models for flapping-wing micro-air vehicles. 2015

Enrique Hernández-Hurtado
Universidad Carlos III de Madrid. Unsteady loads on an airfoil during the deployment of a flap. 2014

Referee Service

International journals

- *Journal of Fluid Mechanics*
- *Flow, Turbulence and Combustion*
- *AIAA Journal*
- *International Journal of Multiphase Flow*
- *International Journal of Heat and Fluid Flow*
- *Journal of Fluids and Structures*
- *Theoretical and Computational Fluid Dynamics*
- *Journal of Fluids Engineering*
- *Physics of Fluids*
- *Journal of Hydraulic Research*
- *Journal of Hydraulic Engineering*
- *Environmental Fluid Mechanics*
- *International Journal for Numerical Methods in Fluids*
- *Journal of Computational Physics*
- *Computers and Fluids*
- *Applied Mathematical Modelling*
- *Scientific Reports*
- *PLOS One*

Research projects

- *Spanish National Evaluation and Foresight Agency (ANEP)*
- *Direction of Evaluation and Accreditation of Andalucia (DEVA)*

International quality labels (EURACE)

- *Spanish National Agency for Quality Assessment and Accreditation (ANECA)*

Conference Service

Organizer of the *Ercoftac Workshop Direct and Large Eddy Simulation 12*. Madrid, Spain. 2019

Member of the Technical Comittee of the *10th Int. Conference on Multiphase Flow*, Rio de Janeiro, Brazil, 2019

Member of the Scientific Comittee of the *Ercoftac Workshop Direct and Large Eddy Simulation 11*. Pisa, Italy. 2017

Member of the Scientific Comittee of the *Ercoftac Workshop Direct and Large Eddy Simulation 10*. Limassol, Cyprus. 2015

Member of the Local Executive Comittee of the *10th International ERCOFTAC Symposium on Engineering Turbulence Modelling and Measurements*. Marbella, Spain. 2014

Member of the Scientific Comittee of the *Ercoftac Workshop Direct and Large Eddy Simulation 9*. Dresden, Germany. 2013

Co-organizer of a Mini-Symposium on Fluid Mechanics in the *4th GACM Colloquium on Computational Mechanics*. Dresden, 2011.

Member of the Scientific Comittee of the *Int. Workshop on Environmental Hydraulics*. Valencia, Spain. 2009

Teaching Experience

Universidad Carlos III de Madrid

- Computational Aerodynamics. MSc Aerospace Eng. (1st year). 1st semester 2014-15, 2015-16, 2016-17, 2018-19.
- Modelling in Aerospace Engineering. BSc Aerospace Eng. (2nd year). 2nd semester 2018-19.

- Aerodynamics. BSc Aerospace Eng. (3rd year). 1st semester 2015-16, 2016-17.
- Turbulence. MSc Industrial Mathematics. (1st year). 2nd semester 2014-15, 2015-16, 2016-17, 2017-18.
- Introduction to Flight Mechanics. BSc Aerospace Eng. (2nd year). 1st semester 2011-12, 2012-13, 2013-14 , 2014-15, 2015-16.
- Aerospace vehicles: complement II. BSc Aerospace Eng. (4th year). 2nd semester 2014-15.
- Advanced Flight Mechanics. BSc Aerospace Eng. (4th year). 1st semester 2013-14, 2014-15.
- Advanced Aerodynamics. BSc Aerospace Eng. (4th year). 1st semester 2013-14.
- Aerospace Propulsion. BSc Aerospace Eng. (3rd year). 1st semester 2012-13.
- Thermal fluid processes. Industrial Engineering (3rd year). 1st semester 2011-12.
- Numerical methods for differential equations. MSc Industrial Mathematics. 1st semester 2011-12.
- Advanced numerics seminar. MSc Industrial Mathematics. 1st semester 2011-12, 2012-13.
- Fundamentals of Aeronautical Engineering. Master in Aircraft Integration Systems. Editions 2011 and 2012.

Karlsruhe Institute of Technology

- Turbulence modelling: RANS and LES. Summer semester 2010.
- Turbulent flows: fundamentals. Winter semester 2009-10.
- Large eddy simulation in fluid mechanics. Winter semester 2007-08, 2008-09.