Mariano Vázquez
M.Sc., Ph.D.

Personal Profile

Born in 1966. Single. Researcher in the field of High Performance Computational Fluid Dynamics. Current residency in Barcelona, Spain (since Dec. 2006).

University Education

- **February 1999** Ph.D. *"Cum laude with honours"* in Physical Sciences (Computational Fluid Dynamics). Technical University of Catalonia (UPC), Barcelona, Spain.
  Doctoral Thesis: *"Numerical modelling of compressible laminar and turbulent flow"*
  Supervisor: Prof. Ramon Codina. Strength of Materials and Engineering Structures Department and International Center for Numerical Methods in Engineering CIMNE, UPC.
  Keywords: Computational Fluid Dynamics, Navier-Stokes Equations. Finite Element Methods, Fractional Step Methods, Compressible Flows, Turbulent Flows, Reynolds Averaged Navier-Stokes, Multigrid.

- **March 1993** M.Sc. in Physical Sciences. University of Buenos Aires (UBA), Argentina.
  M.Sc. Thesis: *"Dynamical Systems Characterization"*
  Supervisor: Prof. Hernán Solari. Physics Department, Exact and Natural Sciences Faculty, UBA.
  Keywords: Computational Physics, Dynamical Systems, Chaos, Braids Theory.

Professional Experience

- **December 2006 - Present Barcelona Supercomputing Center - Centro Nacional de Supercomputación, Barcelona, Spain.**

  Research Group Leader

  Keywords: Fluid Mechanics, Computational Fluid Dynamics, Parallel Computing, CFD Codes Development

  Research Group Leader in the Computer Applications in Science and Engineering CASE Department. Together with G. Houzeaux (GH), they both co-lead a group of 20 scientists: PhD students, Post-doctoral researchers and programming engineers in a research group devoted to High Performance Computational Mechanics. MV and GH are the main developers of Alya, a High Performance Computational Mechanics code, to simulate coupled multi-physics problems such as: CFD (Incompressible and Compressible flows), Non-linear Solid Mechanics, Excitable Media, Acoustics, Thermal or N-bodies, with high parallelization standards, tested up to thousands of processors.

- **September 2004 - September 2007 University of Girona, Girona, Spain.**

  Lecturer (Catalan university position of "Professor Lector") in Fluid Mechanics

Keywords: Fluid Mechanics, Computational Fluid Dynamics, Environmental Flows, Turbulence, Parallel Computing

Lecturer in Fluid Mechanics. Responsible of the course "Fluid Mechanics in Engineering" ("Ingeniería Fluido - Mecánica") for the 1st. year of Technical Mechanical Engineering ("Ingeniería Técnica Mecánica"). His research duties include lines in CFD, Computational Mechanics, Environmental Flows, Turbulence, working in collaboration with researchers of UPC, INRIA (France), Univ. of Montpellier (France), George Mason University (USA). Co-supervisor of a Ph.D. student, Ernesto Fariñas Wong, in "CFD and Optimization in Aeolic Generators" together with Dr. G. Houzeaux (Building, Energy and Environment Group, UPC).

- **December 2002 - September 2004 GridSystems, Palma de Mallorca, Spain.**

Consultant. Responsible of the Aerospace Sector. Local coordinator of European Projects.

Keywords: Grid Computing, Parallel Computing, Aerospace Applied Research

GridSystems is a Spanish based company, world leader in grid computing. The candidate was responsible for the insertion of this new technology in the aerospace sector, being in charge of all the European projects in which the company was involved. He coordinated GridSystems participation in projects with BAE Systems, EADS Toulouse, Astrium, ONERA, DLR, NLR, Intel, Univ. of Edimburgh, Univ. of Paderborn, Liebherr, Fujitsu, etc. He interacted with research groups, related both to universities and companies in the sector in Spain, France, Germany and UK. He also performed both consulting and software development tasks in EADS, Institute Francais du Petrole IFP, Honda Motor Co., BMW, etc.

- **December 2001 - September 2004 INRIA (Institut National de la Recherche en Informatique et en Automatique), Sophia-Antipolis, France.**

Expert Engineer (Post-Doctoral Research), Computational Mechanics in Aerospace Engineering. Since December 2002, he is External Researcher.

Keywords: Computational Fluid Dynamics, Optimal Shape Design, Aeroelasticity, Euler Flows.

Granted by the French Ministry of Research. Development of shape optimisation techniques for supersonic flows coupled with structures in aerospace applied research. The goal is to optimise the wing shape of a supersonic aircraft in order to reduce the so-called sonic boom produced by the shock wave ahead of the plane, which has a dramatic acoustic environmental impact. The optimisation scheme takes into account the aircraft's structural deformation. The geometries to optimise are provided by Dassault Aviation, corresponding to a new supersonic civil jet.

- **March 2000 - October 2001 Dassault Aviation / Universite Pierre et Marie Curie, Pôle Scientifique Paris**

Research Engineer (Post-Doctoral Research), Computational Mechanics in Aerospace Engineering.

Keywords: Computational Fluid Dynamics, Turbulent Flows, Multigrid, Incompressible Flows, Compressible Flows

Granted by the European Commission. Development of speed-up convergence algorithms by the so called multigrid method, in turbulent compressible and incompressible flows, 2D and 3D, solved using implicit schemes. Design of turbulence physical models (RANS models) and their computational implementation by the Finite Elements Method. This work focused mainly on the robustness of the scheme, to render it as reliable as possible to aeronautic engineers.

- **1993 - 2000 CIMNE (International Center for Numerical Methods in Engineering), Barcelona**

Doctoral and Post - Doctoral Research, Computational Mechanics in Aerospace Engineering.

Keywords: Computational Fluid Dynamics, Compressible Flows, Turbulent Flows, Incom-

pressible Flows, Multigrid

Partially granted by NASA Ames Research Centre. Development of a general algorithm for the numerical solution of the Navier - Stokes equations, using fractional step techniques. Compressible and incompressible flow, laminar and turbulent regimes (RANS models), solved using explicit and semi-implicit schemes, by the Finite Elements Method. Study of speed-up convergence techniques, in particular, multigrid.

Publicacions and Conference Papers

International Journals and Reviews

- S. Marras, J.F. Kelly, F.X. Giraldo and M. Vázquez. *Variational multiscale stabilization of high-order spectral elements for the convection-diffusion equation.* J. Comput. Phys. http://dx.doi.org/10.1016/j.jcp.2012.06.028, 2012.

- P. Lafortune, R. Arís, M. Vázquez and G. Houzeaux. *Coupled electromechanical model of the heart: Parallel finite element formulation.* Int. J. Numer. Meth. Biomed. Engng., 28: 72-86. doi: 10.1002/cnm.1494

- G. Houzeaux, R. de la Cruz, H. Owen and M. Vázquez. *Parallel uniform mesh multiplication applied to a Navier-Stokes solver.* Computers and Fluids. http://dx.doi.org/10.1016/j.compfluid.2012.04.017, 2012.

- H. Owen, G. Houzeaux, C. Samaniego, A.C. Lesage and M. Vázquez *Recent ship hydrodynamics developments in the parallel two-fluid flow solver Alya.* Computers and Fluids. http://dx.doi.org/10.1016/j.compfluid.2012.03.022, 2012.

- M. Vázquez, R. Arís, G. Houzeaux, R. Aubry, P. Villar, J. Garcia-Barnes, D. Gil, F. Carreras. *A massively parallel computational electrophysiology model of the heart.* Int. Journal for Numerical Methods in Biomedical Engineering. 27, doi:10.1002/cnm.1443, 2011.

- R. Aubry, G. Houzeaux, M. Vázquez and J.M. Cela. *Some useful strategies for unstructured edge-based solvers on shared memory machines.* Int. Journal for Numerical Methods in Engineering. 85: 537-561. doi: 10.1002/nme.2973, 2011.

- R. Aubry, G. Houzeaux and M. Vázquez. *A surface remeshing approach.* Int. Journal for Numerical Methods in Engineering. 85: 1474-1498. doi: 10.1002/nme.3028, 2011.

- G. Houzeaux, R. Aubry and M. Vázquez. *Extension of fractional step techniques for incompressible flows: The preconditioned Orthomin(1) for the pressure Schur Complement.* Computers and Fluids. 44, 1, 297-313. 2011.

- W. Gentzsch, D. Girou, A. Kennedy, H. Lederer, J. Reetz, M. Riedel, A. Schott, A. Vanni, M. Vázquez and J. Wolfrat. *DEISA - Distributed European Infrastructure for Supercomputing Applications.* Journal of Grid Computing. 9, 2, 259-277. doi: 10.1007/s10723-011-9183-2, 2010.

- G. Houzeaux, M. Vázquez, R. Aubry and J.M. Cela. *A Massively Parallel Fractional step solver for Incompressible flows.* Journal of Computational Physics. 228, 17, 6316-6332. 2009.

- F. Lombardo, F. Mazzitelli, M. Vzquez and P. Villar. *Computing the Casimir energy using the point-matching method.* Physical Review D **80** 065018; 2009.

- G. Houzeaux, B. Eguzkitza and M. Vázquez. *A variational multiscale model for the advection-diffusion-reaction equation.* Communications in Numerical Methods in Engineering. **25** (7), 787-853; 2009.

- M. Vázquez, A. Dervieux and B. Koobus. *A methodology for the shape optimization of flexible wings.* Engineering Computations, Int. Journal for Computer-Aided Engineering and

Software. **23** (4), 344-367; 2006.

- A. Dervieux, M. Vázquez, L. Hascoet y B. Koobus. *Optimization loops for shape and error control.* Recent Trends in Aerospace Design and Optimization. Tata-McGraw Hill. 2005.

- M. Vázquez, A. Dervieux and B. Koobus. *Multilevel optimization of a supersonic aircraft.* Finite Elements in Analysis and Design. **40** (15), 2101-2124; 2004.

- M. Vázquez , M. Ravachol, F. Chalot and M. Mallet. *Multigrid scheme for the full Navier-Stokes equations: the robustness issue in laminar and turbulent, incompressible and compressible flows.* International Journal of Numerical Methods in Fluids. **45** (5), 555-579; 2004.

- O.C. Zienkiewicz, P.Nithiarasu, R. Codina , M. Vázquez and P. Ortiz. *The characteristic - based - split procedure: an efficient and accurate algorithm for fluid problems.* International Journal of Numerical Methods in Fluids, **31**, 359-392; 1999.

- A.Folch, M. Vázquez, R.Codina and J.Martí. *A fractional step finite element method for the Navier-Stokes equations applied to magma chamber withdrawal.* Computer and Geosciences, **25**, 263 - 275; 1999.

- R. Codina, M. Vázquez and O.C. Zienkiewicz. *A fractional step method for the solution of compressible Navier - Stokes equations.* Computational Fluid Dynamics Review 1998, edited by M. Hafez and K. Oshima. Volume I. World Scientific; 1998.

- R. Codina, M. Vázquez and O.C. Zienkiewicz. *A General Algorithm for Compressible and Incompressible Flow. Part III: The Semi - Implicit form.* International Journal of Numerical Methods in Fluids, **27**, 13-32; 1998.

- P.Nithiarasu, O.C. Zienkiewicz, B.V.K. Satya Sai, K. Morgan, R. Codina and M. Vázquez. *Shock capturing viscosities for the general fluid mechanics algorithm.* International Journal of Numerical Methods in Fluids, **28**, 1325-1353; 1998.

- A.Folch, J.Martí, R.Codina and M. Vázquez. *A numerical model for temporal variations during explosive central-vent eruptions.* Journal of Geophysical Research, **103**, 29, 20833 - 20899; 1998.

- H.G. Solari, M.A. Natiello and M. Vázquez. *Braids on the Poincaré section: A laser example.* Physical Review E. **54**, 3185; 1996.

- O.C. Zienkiewicz, K. Morgan, B.V.K. Satya Sai, R. Codina and M. Vázquez. *A General Algorithm for Compressible and Incompressible Flow. Part II: Tests on the Explicit Form.* International Journal of Numerical Methods in Fluids, **20**, 887-913; 1995.

Reports, Book Chapters and other Publications:

- M. Vázquez, A. Dervieux and B. Koobus. *Aeroelastic coupling in sonic boom optimization of a supersonic aircraft.* INRIA Report RR-4865, 2003.

- M. Vázquez, A. Dervieux, B. Koobus and Ch. Farhat. *Spatial discretization issues for the energy conservation in compressible flow problems in moving grids.* INRIA Report RR-4742, 2003.

- M. Vázquez, A. Dervieux and B. Koobus. *Aerodynamical and sonic boom optimization of a supersonic aircraft.* INRIA Report RR-4520, 2002.

- M. Vázquez, R. Codina and O.C. Zienkiewicz. *Numerical modelling of compressible laminar and turbulent flow: The CBS algorithm.* CIMNE Monography, Num. 50; April 1999.

- R. Codina, M. Vázquez and O.C. Zienkiewicz.*A fractional step method for the solution of the Compressible Navier - Stokes equations.* CIMNE Report, Num. 118; July 1997.

- R. Codina, M. Vázquez and O.C. Zienkiewicz. *A General Algorithm for Compressible and Incompressible Flows. The Semi - Implicit form.* CIMNE Report, Num. 108; February 1997.

- M. Vázquez, R. Codina and O.C. Zienkiewicz. *A fractional step method for the solution of the Navier - Stokes equations.* CIMNE Report, Num. 103; 1996.

- R. Codina, E. Oñate and M. Vázquez. *Progress Report on the Hermes Project .* HERMES Project Report (Research Num. ALG91/11 STEP 2), Barcelona; 1993.

Articles in Conferences:

- L. Margetts and M. Vázquez *Optimizing data locality for the efficient solution of Multi-Physics problems on systems with thousands of multicore processors* Presented at Many-core and Reconfigurable Supercomputing Conference. Rome, Italy. 2010

- M. Vázquez, R. Arís, P. Lafortune, P. Villar, G. Houzeaux, D. Gil, J. Garcia-Barnes, M. Ballester and F. Carreras. *Massively parallel electromechanical model of the heart* Presented at Computer Methods in Biomechanics and Biomedical Engineering. Valencia, Spain. 2010.

- R. Aubry, G. Houzeaux and M. Vázquez *A surface remeshing approach* Presented at 48th AIAA Aerospace Sciences Meeting. Orlando, USA. 2010

- S. Marras, M. Vázquez, O. Jorba, R. Aubry and J. M. Baldasano *A Parallel, Variational Multiscale (VMS) Finite Element Approach to Atmospheric Modeling* Presented at ICCSME Conference. Greece, 2009.

- Simone Marras, Mariano Vázquez, Oriol Jorba, Romain Aubry, Guillaume Houzeaux and J. M. Baldasano *Application of a Galerkin Finite Element Scheme to Atmospheric Buoyant and Gravity Driven Flows* Presented at 48th AIAA Aerospace Sciences Meeting. Orlando, USA. 2010

- G. Houzeaux, R. Aubry, M. Vázquez, H. Calmet, F. Mut, S. Wright, G. Ascoli, J. Cebral *Large-scale CFD in Cerebral Hemodynamics: Characterizing Arterial Flow* Presented at 1st. COMPBIOMED. Swansea, UK. 2009

- Debora Gil, Jaume Garcia-Barnes, Ruth Ars, Guillaume Houzeaux, Mariano Vázquez *A Riemannian Approach to Cardiac Fiber Architecture Modelling* Presented at 1st. COMPBIOMED. Swansea, UK. 2009

- R. Ars, G. Houzeaux, M. Vázquez, Debora Gil, Jaume Garcia-Barnes *Massively Parallel Cardiac Computational Electrophysiology in Anisotropic Media* Presented at 1st. COMPBIOMED. Swansea, UK. 2009

- Donal J. Taylor, Denis J. Doorly, Robert C. Schroter, Joaquim Peir, Esther Blenke, Robert Almeyda, Neil Tolley, Guillaume Houzeaux, Mariano Vázquez *High Performace Computational Modelling of the Nasal Airflow* Presented at 1st. COMPBIOMED. Swansea, UK. 2009

- F. Rubio, M. Hanzich, R. Ars, G. Houzeaux and M.Vázquez *Parallel Computational Electrophysiology in Cell/B.E. Processors* Presented at 1st. COMPBIOMED. Swansea, UK. 2009

- R. de la Cruz, M. Araya-Polo, M. Vázquez, G. Houzeaux, M. Jowkar and J. M. Cela *Porting to Cell/B.E. the Alya System, a High Performance Computational Mechanics Code* Presented at ParCFD 2009. Mountainview, USA. 2009

- R. Aubry, M. Vázquez y G. Houzeaux *CFD-ready Mesh Generation Strategy in Large-scale Parallel Compressible Flow Problems* Presented at FEF09, Int. Conf. on Finite Elements in Fluids. Tokio, Japan. 2009.

- A-C. Lessage, G. Houzeaux, M. Vázquez y P. Lafortune *A High-Performance Parallel Predictor Corrector Incompressible Navier-Stokes Eulerian Two-Phase Flow Solver using the Level Set Method.* Presented at FEF09, Int. Conf. on Finite Elements in Fluids. Tokio, Japan. 2009.

- M. Vázquez, R. Aris, A. Rosolen y G. Houzeaux *A high performance computational electrophysiology model* Presented at WCCM8 - ECCOMAS 2008 8th. World Congress on Computacional Mechanics Venecia, Italia. 2008

- D. Gil, J. Garcia-Barnes, M. Vázquez, R. Aris and G. Houzeaux *Patient-Sensitive Anatomic and Functional 3D Model of the Left Ventricle* Presented at WCCM8 - ECCOMAS 2008 8th. World Congress on Computacional Mechanics Venecia, Italia. 2008

- M. Vázquez y G. Houzeaux *Very low Mach number problems and the CBS scheme: non-hydrostatic atmospherics modelling for numerical weather prediction* Presented at WCCM8 - ECCOMAS 2008 8th. World Congress on Computacional Mechanics Venecia, Italia. 2008

- G. Houzeaux y M. Vázquez *Parallel implementation of a predictor-corrector scheme for the solution of the Navier-Stokes equations* Presented at WCCM8 - ECCOMAS 2008 8th. World Congress on Computacional Mechanics Venecia, Italia. 2008

- G. Houzeaux, M. Vázquez, X. Saez y J.M. Cela *Hybrid MPI-OpenMP performance in massively parallel computational fluid dynamics* Presented at PARCFD 2008 Internacional Conference on Parallel Computacional Fluid Dynamics Lyon, Francia. 2008

- T. Pujol, M. Vázquez, G. Houzeaux, J. R. González, L. Montoro and M. Pelegr *Alya - Programa de Mecánica Computacional Avanzada Caso de Estudio: Aerodinámica Externa* Presented at XVII Congreso Nacional de Ingeniera Mecánica Gijn, Espaa. 2008

- M. Vázquez, G. Houzeaux, R. Grima, H. Calmet y J.M. Cela *Applications of parallel computational fluid mechanics in Marenostrum supercomputer: low-Mach compressible flows* PARCFD 2007 Internacional Conference on Parallel Computacional Fluid Dynamics Antalya, Turqua. 2007

- G. Houzeaux, M. Vázquez, R. Grima, H. Calmet y J.M. Cela *Experiences in parallel computational mechanics in Marenostrum* Invited Paper Presented at PARCFD 2007 Internacional Conference on Parallel Computacional Fluid Dynamics Antalya, Turqua. 2007

- A.M. Rosolen, S. Ordás y M. Vázquez *Numerical schemes for the simulation of three-dimensional cardiac electrical propagation in patient-specific ventricular geometries* Presented at ECCO-MAS 2006 Computational Fluid Dynamics Conference Egmond aan Zee, Pases Bajos. 2006

- F. Courty, T. Roy, B. Koobus, M. Vázquez and A. Dervieux *Continuous error analysis for P1-Exact schemes* Presented at the FEF05 - Finite Elements for Flow Problems. Swansea, UK, 2005.

- M. Vázquez, B. Koobus and A. Dervieux. *Multi-disciplinary sonic boom optimization of a supersonic civil jet.* Presented in the ECCOMAS 2004 Computational Fluid Dynamics Conference. Jyvaskila, Finland; July 2004.

- M. Vázquez, and A.Dervieux. *Grid computing in genetic algorithms: a POD based scheme in aerodynamic optimisation.* Presented at the EUROGEN 03 Conference on Evolutionary Methods for Design, Optimisation and Control, with Applications to Industrial and Societal Problems. Barcelona, Spain, September 2003.

- L. Hascoet, M. Vázquez, and A. Dervieux. *Automatic differentiation for optimum design, applied to sonic boom reduction.* Presented at the International Conference on Computational Science and its Applications, ICCSA'03, Montreal, Canada, May 2003.

- A. Dervieux, F. Courty, M. Vázquez and B. Koobus. *Additive multilevel optimization and its application to sonic boom reduction.* Presented at Numerical Methods for Scientific Computing - JP60 Meeting Variational Problems and Applications. Jyvaskyla, Finland, June 14-15, 2002.

- A. Dervieux, B. Koobus, C. Farhat, M. Vázquez, R. Carpentier and E. Schall. *Numerical models for computing unsteady fast flows and their interaction with structures.* To be presented in the WEHSFF 2002, West East High Speed Flow Field Conference. Marseille, France; April 2002.

- M. Vázquez, M. Ravachol and M. Mallet. *Multigrid Applied to a Fully Implicit FEM Solver for Turbulent Incompressible Flows.* Presented in the ECCOMAS 2001 Computational Fluid Dynamics Conference. Swansea, United Kingdom; September 2001.

- M. Vázquez, G. Houzeaux and R. Codina. *Chimera type domain decomposition methods applied*

to fractional step finite element schemes for incompressible flows. Presented in the ECCOMAS 2000 Computational Fluid Dynamics Conference. Barcelona, Spain; September 2000.

- P.Nithiarasu, O.C. Zienkiewicz, B.V.K. Satya Sai, K. Morgan, R. Codina and M. Vázquez. *Shock capturing viscosities for the general algorithm.* Presented in the 10th Int. Conf. on Finite Elements in Fluids. Tucson, USA; January 1998.

- R. Codina, M. Vázquez and O.C. Zienkiewicz. *An implicit fractional step finite element method for incompressible and compressible flows.* Presented in the 10th Int. Conf. on Finite Elements in Fluids. Tucson, USA; January 1998.

- M. Vázquez and R. Codina. *Numerical Solution of the Navier Stokes Equations using a Splitting Technique with Multigrid Acceleration.* Presented in the 4th. World Congress on Computational Mechanics. Buenos Aires, Argentina; June 1998.

- M. Vázquez and R. Codina. *Numerical Modelization of Compressible Turbulence.* Presented in the IV Workshop in Advances in Turbulence, Fluid Dynamics in Geophysics and Turbulent Diffusion in the Environment. UPC, Barcelona, Spain; October 1998.

- R. Codina, M. Vázquez and O.C. Zienkiewicz. *A fractional step method for compressible flows: boundary conditions and incompressible limit.* Presented in the IX Finite Elements in Fluids, Venice, Italy; October 1995.

- E. Oñate, R. Codina and M. Vázquez. *Cost-efficiency analysis of finite element solutions for high speed Euler flows.* Presented in the II European Conference on Computational Fluid Dynamics. Stuttgart, Germany; September 1994.

- H. Solari and M. Vázquez. *Caracterización de Sistemas Dinámicos.* Presented as a poster in the la 77th. National Physics Meeting of the Physics Argentine Association. Buenos Aires, Argentina; October 1992.

Others

- Seminar *Turbulent Models in Compressible Flows* for the "Seminars in Geophysical Turbulence" of the Geophysical Turbulence Network. UPC, Barcelona, Spain. February 1996. Unpublished.

- Monography *Soluciones Autosimilares en Fluidos Viscosos.* University of Buenos Aires, Buenos Aires, October 1991. Unpublished.

Fellowships and Research Projects Participations

- **2010 - 2013** VI Programme - European Project "Advanced Technologies for the Production of Cement and Clean Aggregates from Construction to Demolition Waste C2CA". Project leader: Dr. Francesco di Maio (Delft University, Netherlands)

- **2011 - 2014** VI Programme - European Project "Marie-Curie ITN Coupled Parallel Simulations of Gas Turbines COPA-GT". Project leader: Dr. Benedicte Cuenot (CERFACS, France)

- **2008 - 2012** VI Programme - European Project "Distributed European Infrastructure for Supercomputing Applications DEISA-2". Project leader: Dr. S. Heinzel (Leibniz Computing Centre of the Bavarian Academy of Sciences and Humanities, Germany)

- **2008 - 2012** VI Programme - European Project "Magnetic Sorting and Ultrasound Sensor Technologies for Production of High Purity Secondary Polyolefins from Waste W2PLASTICS". Project leader: Dr. F. di Maio (Delft University, Netherlands)

- **2007 - 2012** Spanish Ministry of Education Project "Supercomputación y E-Ciencia CONSOLIDER". Project leader: Prof. Mateo Valero (BSC-CNS, Spain)

- **2006 - 2009** Spanish Ministry of Industry Project "Consorcio para el desarrollo de tecnologías

avanzadas para la medicina CDTEAM". Project leader: Dr. Manuel Desco (Htal. Gregorio Marañón, Spain)

- **2003 - 2007** VI Programme - European Project "Next Generation Grids NEXTGRID". In collaboration with researchers in Univ. of Edinburgh, Intel, Fujitsu, Microsoft, Univ. of Queens Belfast, etc. Project leader: Dr. M. Parsons (Univ. of Edinburgh, UK)

- **2003 - 2007** VI Programme - European Project "Installed Performance of Antennae in Aerospace Structures IPAS". In collaboration with researchers in EADS CCR Toulouse, BAE Systems, Astrium, Chelton, DLR, etc. Project leader: Dr. T. Macnamara (BAES).

- **2001 - 2002** French Ministry of Research Project, under the "Research and Technological Innovation Network: Supersonic Aeronautical Research", titled, "Numerical Optimisation of Acoustic and Aerodynamic Performances for a Transport Supersonic Aircraft". In collaboration with the Montpellier University and Dassault Aviation. Held in INRIA Sophia-Antipolis, France. Project leader: Prof. Alain Dervieux.

- **2003 - 2004** "Torres Quevedo" Programme Spanish Fellowship, for contracting young doctors in R+D areas in companies and research centers. Held in GridSystems.

- **2000 - 2001** Post-Doctoral "Marie Curie" CE Fellowship, in the research project "Non-linear multigrid for incompressible turbulent flows". Held in Pole Scientifique, Dassault Aviation - Universite Pierre et Marie Curie, Paris, France. Project supervisor: Dr. Michel Mallet.

- **1993 - 2000** NASA Ames Research Center Research Project "Solution algorithms for high speed compressible flows." NAGW/2127, Ames control number 90-144, in collaboration with the Institute of Numerical Methods in Engineering, University College of Swansea, UK. Held in CIMNE, UPC, Barcelona, Spain.

- **1997 - 2000** FPI (Researchers Training) Doctoral Fellowship, from the Ministry of Education from Spain.

- **1993 - 1994** European Community HERMES Project "Accuracy of flow solvers using structured and unstructured meshes". Ref.: 08W01581. Held in CIMNE, UPC, Barcelona, Spain.

Research Stages in Foreign Centers

- **February 2000 - October 2001** Pôle Scientifique Dassault Aviation - Université Pierre et Marie Curie (Paris VI). St. Cloud, France. Post-doctoral research.

- **November 2001 - December 2002** INRIA Sophia Antipolis, France. Post-doctoral research.

- **July - August, 1998** Berkeley University in California, USA. In the Civil and Environmental Engineering Department. Work in collaboration with researchers in the host department.

- **March, 1997** University of Wales, Swansea, UK. In the Civil Engineering Department, in the Institute for Numericals Methods in Engineering. Work in collaboration with researchers in the host department.

Teaching

Professor in the Department of Mechanical Engineering, "Escola Politécnica Superior", University of Girona. Courses:

- Fluid Mechanics in Engineering.

Teaching Assistant in the Physics Department, Exact and Natural Sciences Faculty, University of

Buenos Aires, Argentina. Courses:

- Physics for Biology and Geology, three semesters.
- Theoretical Physics I (Classical Electrodynamics), one semester.

Miscelaneous information

- He holds the Spanish ANECA accreditations "PROFESOR AYUDANTE DOCTOR" and "PROFESOR COLABORADOR", obtained in 2003.
- Reviewer in the following journals:
  - International Journal for Numerical Methods in Biomedical Engineering
  - International Journal of Numerical Methods in Fluids
  - Computers and Fluids
  - Archives of Computational Methods in Engineering
- Language skills: Spanish (native), English (fluent - s/r/w), French (fluent - s/r, good - w), Catalan, Italian and Portuguese (good - s/r).
- Computational Background: Extensive using of programming languages like Fortran 77/90 and C++. User level knowledge of UNIX and administrator/user level knowledge of LINUX. Perl, Tcl and C Shell interpreters. PVM/MPI/Unix sockets. SOAP Lite. Windows based applications (Word, Power Point, etc.). Research oriented applications for CFD (GiD, OpenDX, Matlab, etc.). Grid computing tools (InnerGrid).
- Other research interests: Neural networks and computational mechanics applied to biophysics (neurosciences, hemodynamics, magnetic resonance), meteorology, astrophysics, nanotechnology (MEMS). General relativity and cosmology.
- Sports: sailing, cycling. Amateur electronic musician. Reading. Classical cinema.

References

Available upon request.