CURRICULUM VITÆ

Personal data

Name: Rodrigo Rafael PAZ
Nationality: Argentine
Date of birth: May 8, 1974
Place of birth: Río Turbio, Pcia. de Santa Cruz, Argentina.
Address: Eva Perón 2641 Piso 8, Dpto B, 3000 - Santa Fe, Argentina. Tel: +54-342-4810312.
Work: INTEC, Güemes 3450, 3000-Santa Fe, Argentina
Tel/Fax: +54-342-4511594.
E-mail: <rodrigop@intec.unl.edu.ar>
Home-page: http://www.intec.ceride.gov.ar/~rodrigop
Marital status: married

Studies

- in progress: Ph.D. in Engineering Sciences, Computational Mechanics. Title: "*Domain Decomposition Techniques and Parallel Programming in Computational Fluid Dynamics*" *Universidad Nacional del Litoral.*, Santa Fe, Argentina.
- Degree in Aeronautical and Mechanical Engineering. *Facultad de Ciencias Exactas, Físicas y Naturales.* Universidad Nacional de Córdoba. Córdoba, Argentina (1993-1999).
- Amérique Latine Formation Académique. Projet ALFA *Université Pierre et Marie Curie - Paris VI. Laboratoire de Modélisation en Mécanique. Paris, France* subject: "*Numerical tests in the Asymptotic Domain Decomposition Method*" (2000).
- Chemical and Biological Undergraduate School. *Colegio Central Universitario "Mariano Moreno". Universidad Nacional de San Juan.* San Juan, Argentina (1988-1992).

Languages:

french, english, portuguese, spanish.

Occupation

- Assistant Professor, **"Algorithms and Data Structures"**. Universidad Nacional del Litoral. Santa Fe, Argentina (since year 2002), with Dr. Mario Storti.
- Assistant Professor, **"Continuum Mechanics"**. Universidad Nacional del Litoral. Santa Fe, Argentina (since year 2002), with Dr. Alberto Cardona.
- Ph.D. student, CONICET-UNL (Argentina).
- Assistant Professor, **"Introduction to Tensor Calculus and their Applications on Continuum Mechanics"**. PhD. Course for Engineering, Physics and Mathematics postgraduate program at Universidad Nacional del Litoral. Santa Fe, Argentina (since year 2004), with Dr. Norberto Nigro.

Referee in Journals

- Referee for the *International Journal for Numerical Methods in Fluids*. John Wiley & Sons.
- Referee for the journal *Hydraulic Engineering, Mexico*.

Publications

In referred journals.

Total: 8, 4 published, 2 in press, 2 to be submitted.

1. **Rodrigo R. Paz and Mario A. Storti.** "An Interface Strip Preconditioner for Domain Decomposition Methods: Application to Hydrology". *International Journal for Numerical Methods in Engineering*, **62(13)**:1873-1894, 2005.
2. **S. A. Vera; M. Febbo; C. G. Méndez; R. R. Paz.** "Vibrations of a plate with an attached two degree of freedom system". *Journal of Sound and Vibration*, **285(1-2)**:457-466, 2004.
3. **Lisandro Dalcín, Rodrigo R. Paz and Mario A. Storti.** "MPI for Python". *Journal of Parallel and Distributed Computing*, **65(9)**:1108-1115, 2005.
4. **Rodrigo R. Paz, Norberto M. Nigro and Mario A. Storti.** "On the efficiency and quality of numerical solutions in CFD problems using the Interface Strip Preconditioner for domain decomposition methods". *International Journal for Numerical Methods in Fluids*, (2005). In press.
5. **M. Storti; L. Dalcín; R. Paz; A. Yommi; V. Sonzogni; N. Nigro.** "A Preconditioner for the Schur Complement Matrix". *Advances in Engineering Software*, (2005). In press.
6. **Storti, M. ; Dalcín, L. ; Paz, R. ; Yommi, A. ; Sonzogni, V. ; Nigro, N.** "Interface Strip Preconditioner for Domain Decomposition Methods". *Journal of Computational Methods in Sciences and Engineering*, (2003). In press.
7. **Mario A. Storti, Norberto M. Nigro, Rodrigo R. Paz and Lisandro Dalcín**. "*Dynamic Boundary Conditions in Fluid Mechanics"*.(to be submitted).
8. **Lisandro Dalcín, Rodrigo R. Paz, Andrés Anca, Mario A. Storti**. "*Parallel Fem Application Development in Python"*.(to be submitted).

In books or book chapters (referred).

Total: 11.

1. **Rodrigo R. Paz, Norberto M. Nigro and Mario A. Storti**. "*Inviscid/Viscous Hypersonic Flow in Confined Ducts and Around of Immersed Bodies Considering Anisotropic Shock Capturing and Adaptive Mesh Refinement Techniques"*. (Referred). Mecánica Computacional - Vol. XXIV. Axel Larrateguy (edts.). AMCA, 2005. Pags 2223-2246. ISSN 1666-6070.
2. **Lisandro Dalcín, Rodrigo R. Paz, Andrés Anca, Mario A. Storti and Jorge D'Elia**. "*Parallel Fem Application Development in Python"*. (Referred). Mecánica Computacional - Vol. XXIV. Axel Larrateguy (edts.). AMCA, 2005. Pags 1823-1838. ISSN 1666-6070.
3. **Mario A. Storti, Norberto M. Nigro, Rodrigo R. Paz and Lisandro Dalcín**. "*Dynamic Boundary Conditions in Fluid Mechanics"*. (Referred). Mecánica Computacional - Vol. XXIV. Axel Larrateguy (edts.). AMCA, 2005. Pags 2573-2595. ISSN 1666-6070.
4. **Paz, Rodrigo R. ; Storti, Mario A.**.*"An Interface Strip Preconditioner for Domain Decomposition Methods: Application to the Coupled Surface and Groundwater Flow"*, (referred). Mecánica Computacional - Vol. XXIII. G. Buscaglia, E. Dari, O. Zamonsky (edts.) AMCA, 2004. Pags 3165-3189. ISSN 1666-6070.
5. **Dalcín, Lisandro ; Storti, Mario A. ; Paz, Rodrigo R.** .*"Development of Parallel Applications in Python"*, (referred). Mecánica Computacional - Vol. XXIII. G. Buscaglia, E. Dari, O. Zamonsky (edts.) AMCA, 2004. Pags 3153-3163. ISSN 1666-6070.
6. **Vera, Sergio A. ; Febbo, Mariano ; Méndez, Carlos G. ; Paz, Rodrigo R.**.*"Free Vibration Analysis of a two-dofs system mounted on an elastic beam"*, (referred). Mecánica Computacional - Vol. XXIII. G. Buscaglia, E. Dari, O. Zamonsky (edts.) AMCA, 2004. Pags 1059-1067. ISSN 1666-6070. q

7. **Paz, R. ; Storti, M. ; Idelsohn, S. ; Rodríguez, L. ; Vionnet, C.**. *"Modelo Distribuido de Elementos Finitos para Flujo Superficial y Subsuperficial Acoplado en Hidrología: Cuencas de Santa Fe, Argentina, Condición de Borde Absorbente"*. Referred. Proceedings of "XXI Congreso Latinoamericano de Hidráulica". São Pedro. Estado de São Paulo, Brasil, 2004.)
8. **Paz, R.R. ; Storti, M. ; Idelsohn, S. ; L. B. Rodríguez and C. A. Vionnet**. *"Parallel finite element model for coupled surface and subsurface flow in hydrology: Province of Santa Fe basin, absorbent boundary condition"*. Mecánica Computacional - Vol. XXII. Marta B. Rosales, Víctor H. Cortínez y Diana V. Bambill (edts.). AMCA, 2003. Pags 339-353. ISSN 1666-6070
9. **Paz, R.R.; Storti, M. ; Idelsohn, S. ; L. B. Rodríguez ; C. A. Vionnet and G. P. Farias**. *"Parallel finite element model for surface and subsurface hydrology"*, (referred). Mecánica Computacional - Vol. XXI. Sergio R. Idelsohn, Victorio E. Sonzogni y Alberto Cardona (edts.). AMCA, 2002. Pags 2343-2360. ISSN 1666-6070.
10. **Storti, M. ; Dalcín, L. ; Paz, R.R. ; Yommi, A. and Sonzogni V.** *"An Interface Strip Preconditioner for Domain Decomposition Methods"*, (referred). Mecánica Computacional - Vol. XXI. Sergio R. Idelsohn, Victorio E. Sonzogni y Alberto Cardona (edts.). AMCA, 2002. Pags 2991-3007. ISSN 1666-6070.
11. **Paz, R.R.; Storti, M. ; Idelsohn, S.** *Finite Element model for Multi-aquifer systems*. Mecánica Computacional - Vol. XX. Fernando G. Flores (edts.). AMCA, 2001. Pags 219-226. ISSN 1666-6070.

In congresses:

Total: 16 , 16 works presented in 10 congresses.

- "6th Argentine Symposium on Computing Technology" JAIIO, september 2005.
  - **Mario A. Storti, Lisandro Dalcín, Rodrigo R. Paz**.*"Avances en Cálculo Paralelo para Mecánica Computacional: MPI para Python y el Método de Descomposición de Dominios"*. Plenary talk.
- VIII Argentinian Congress on Computational Mechanics. MECOM 2005.
  - **Rodrigo R. Paz, Norberto M. Nigro and Mario A. Storti**.*"Inviscid/Viscous Hypersonic Flow in Confined Ducts and Around of Immersed Bodies Considering Anisotropic Shock Capturing and Adaptive Mesh Refinement Techniques"*. Referred.
  - **Lisandro Dalcín, Rodrigo R. Paz, Andrés Anca, Mario A. Storti and Jorge D'Elia**.*"Parallel Fem Application Development in Python"*. Referred.
  - **Mario A. Storti, Norberto M. Nigro, Rodrigo R. Paz and Lisandro Dalcín**.*"Dynamic Boundary Conditions in Fluid Mechanics"*. Referred.
- "XIV Congress on Numerical Methods and their Applications". Bariloche, Argentina, (November 2004).
  - **Paz, Rodrigo R. ; Storti, Mario A.**.*"An Interface Strip Preconditioner for Domain Decomposition Methods: Application to the Coupled Surface and Groundwater Flow"*. Referred.
  - **Dalcín, Lisandro ; Storti, Mario A. ; Paz, Rodrigo R.** .*"Development of Parallel Applications in Python"*. Referred.
  - **Vera, Sergio A. ; Febbo, Mariano ; Méndez, Carlos G. ; Paz, Rodrigo R.**.*"Free Vibration Analysis of a two-dofs System Mounted on an Elastic Beam"*. Referred.
- National Congress on Water 2005 - Water Resources Symposium. Mendoza, Argentina, (May 2005).
  - **Paz, R. ; Storti, M. ; Idelsohn, S. ; Rodríiguez, L. ; Vionnet, C**.*"Groundwater/Surface Water Simulation by mean of Parallel Finite Element Method"*.
- "VII International Assembly of the IAHS". April 2005, Foz do Iguazu, Brasil.

- **Rodríguez, R. Giampieri, C. Vionnet, R. Paz, M. Storti, S. Idelsohn, D. Krohling, and M. Iriondo**. *"Modeling Surface Water/Groundwater Interaction at Large Scale on the Lower Salado River Basin, Santa Fe, Argentina"*.

- "XXI Hydraulic Latinamerican Congress". São Pedro. Estado de São Paulo, Brasil, (October 2004).
  - **Paz, R. ; Storti, M. ; Idelsohn, S. ; Rodríguez, L. ; Vionnet, C.**. *"Modelo Distribuido de Elementos finitos para Flujo Superficial y Subsuperficial Acoplado en Hydrología: Cuencas de Santa Fe, Argentina, Condición de Borde Absorbente*. Referred.
- "XIII Congress on Numerical Methods and their Applications". Bahía Blanca, Argentina, (November 2003).
  - **Paz, R. ; Storti, M. ; Idelsohn, S. ; Rodríiguez, L. ; Vionnet, C.**. *"Parallel finite element model for coupled surface and subsurface flow in hydrology: Province of Santa Fe basin, absorbent boundary condition"*.
  - **M. Storti ; L. Dalcín ; R. Paz**. *"An interface strip preconditioner for domain decomposition methods"*
- "International Conference on Hydrology: Science and Practice for the 21st Century". British Hydrological Society. Imperial College, London, UK. (July 2004).
  - **Rodríguez, L. ; Giampieri R. ; Vionnet, C. ; Paz, R. ; Storti, M. ; Idelsohn, S**. *"Modelling the Impact of Changing Hydrology in the Interaction Between Groundwater-Surface Water at Large Scales in Santa Fe, Argentina"*.
- "First South-American Congress on Computational Mechanics, III Brazilian Congress on Computational Mechanics, VII Argentinean Congress on Computational Mechanics". Santa Fe, Argentina, (October 2002).
  - **R. R. Paz ; M. A. Storti ; S. R. Idelsohn ; L. B. Rodríguez ; C. A. Vionnet ; G. P. Farias**. *"Parallel finite element model for surface and subsurface hydrology"*.
  - **M. Storti ; L. Dalcín ; R. Paz ; A. Yommi ; V. Sonzogni**. *"An interface strip preconditioner for domain decomposition methods"*.
- "XII Congress on Numerical Methods and their Applications". Córdoba, Argentina, (October-November 2001).
  - **Paz, R. ; Storti, M. ; Idelsohn, S.** *"Finite Element model for Multi-aquifer systems"*.

Thesis and reports.

1. **Paz, R.R. ; Panasenko, G.P. ; Ruas, V.** *"Essais Numériques de la Méthode de Décomposition Asymptotique de Domaine"*. Soutenance de Stage de travaille, D.E.A., Equipe d'Analyse Numérique, Faculté des Sciences Jean Monnet. Université de Saint-Etienne. France, 2000.
2. **Mario A. Storti, Norberto M. Nigro and Rodrigo R. Paz.** *"Advances in Domain Decomposition Method techniques."*. Seminar at UBA. Buenos Aires. Argentina. 2005.
3. **Norberto M. Nigro, Rodrigo R. Paz, Germán Filippini and Mario A. Storti.** *"Numerical predictions of several configurations of circular cylinders"*. Available online at `http://www.cimec.org.ar/cylinders`
4. **Mario A. Storti, Norberto M. Nigro and Rodrigo R. Paz.** *" PETSc-FEM: A General Purpose, Parallel, Multi-Physics FEM Program"*. User's Manual and Web Page (`http://www.cimec.org.ar/petscfem`).
5. **Paz, R.R.** *"A Study about Structural Integrity of Microsatellite Solar Arrays"*. Undergraduate Thesis, Facultad de Ciencias Exactas, Físicas y Naturales. Universidad Nacional de Córdoba Library , Argentina, 1999.

6. **Storti, M.A. ; D'Elia, J. ; Paz, R.R.; Dalcín, L.** *"Algorithms and Data Structures"*. Copyright (c) 2004-2005, Mario A. Storti, Jorge D'Elía, Rodrigo R. Paz and Lisandro Dalcín. [Home-page:] http://www.cimec.org.ar/aed.
7. **Cimec CFD Division.** *" PETSc-FEM: A Parallel Finite Element Code For CFD Applications Running on a Beowulf Cluster"*. Features of the PETSc-FEM Code .
8. **Paz, R.R. ; Torresán, G. ; Zapico, E.** *"A Study about Structural Integrity of Micro-satellite Solar Arrays"*. Subsection to the 16th Brazilian Congress of Mechanical Engineering. COBEM 2001.
9. **Paz, R.R. ; Torresán, G. ; Zapico, E.** *"A Study about Structural Integrity of Micro-satellite Solar Arrays"*. Subsection to Jornadas SAM 2000. "IV Latinoamerican Colloquium on Fracture and Fatigue".
10. **Rodrigo R. Paz and Norberto M. Nigro**. *"Loxodromes in Curvilinear Basis"*, 2004.
11. **Mario Storti, Rodrigo Paz, Lisandro Dalcín y Sergio Idelsohn** *"PETSc-FEM applications in Hydraulics"*. Meeting at Regional Hydrological Council, Santa Fe. 2002.
12. **Krohling D. ; Iriondo M. ; Vionnet C. ; Rodríguez L. ; Giampieri R. ; Idelsohn S. ; Storti M. ; Paz R.**. Annual and Periodical Reports for the FLAGS project. 2002-2004.
13. **Idelsohn S.R. ; Storti M.A. ; Paz R.R.**. Report of the "National Agency for Scientific and Technological Support" Technical Inspection. March, 2005.

Consulting

- *Weak/Strong Fluid Structure Interaction at Hypersonic Mach Numbers.* European Space Agency-ESTEC-Open Engineering Project.

Copyrights

- **PETSc-FEM**. A general purpose, parallel, multi-physics FEM program for CFD applications based on MPI/PETSc. Mario A. Storti, Norberto M. Nigro and Rodrigo R. Paz. Copyright (C) 1999-2005
  CIMEC, Internacional Center for Computational Methods in Engineering, Santa Fe, Argentina. http://www.cimec.org.ar/petscfem
  CIMEC-INTEC, Güemes 3450, 3000 Santa Fe, Argentina.
- **MPI for Python**. Bindings of the Message Passing Interface (MPI) standard for the Python programming language. http://www.cimec.org.ar/python/mpi4py.html
- **PETSc for Python**. A subset of PETSc functionalities and Numarray package to manage efficiently input and output of array data from Python Environments. http://www.cimec.org.ar/python/petsc.html.
- **Parallelized Python Interpreter**. A lightweight approach to parallelize the Python interpreter with MPI. http://www.cimec.org.ar/python/pythony.html
- **ParMETIS for Python**. A Python port to ParMETIS library. http://www.cimec.org.ar/python/parmetis.html

Research Scholarships

- Scolarship at Consejo Nacional de Investigaciones Científicas y Tecnológicas (CONICET). Argentina. Ph.D. scolarship (years 2001-2006).
- Scolarship at Agencia Nacional de Promoción Científica y Tecnológica. Argentina. Ph.D. scolarship FLAGS-PROA grants (year 2001).
- Scolarship in Projet ALFA. Commission Européenne - Laboratoire de Modélisation en Mécnique - Université Pierre et Marie Curie (Paris VI), France. (Année 2000)

I+D Projects.

- *PID-99/74. FLAGS: Large scale simulation of the interaction between surface and sub-surface flows*. Director: **Sergio Idelsohn.** (2001-2004)
- *Proyecto Nro. PICT 6973, BID 1201/OC-AR. Developments in computational mechanics using advanced programming techniques*. Director: **Sergio Idelsohn.** (2000-2003)
- *E.C Alpha Program. "Sinus Pim B: Modélisation et Simulation Numériques en Ingeniérie Mécanique"*. Directors: **Sergio Idelsohn** and **Vittoriano Ruas** (Univ. Paris VI, Laboratoire de modélisation en Mécanique.) CONICET - European Community. 2000.
- *PAV2003-00127. ProTIC: A Net for Information Technologies and Communications*. Director: **Guillermo Marshall.** (2005-2007)

Thesis Adviser.

- Student: *Torres, Milva*.
  Type of thesis: *University graduation thesis.*
  Title: *"Development of a CAD-like multiplatform environment in C++"*.
  Status: *defended July, 2004*.
- Student: *Del Barco, Emmanuel*.
  Type of thesis: *University graduation thesis.*
  Title: *"Development of a CAD-like multiplatform environment in C++"*.
  Status: *defended July, 2004*.

Jury

- Jury in the 8th Meeting of Young Researchers of the "Universidad Nacional del Litoral". Santa Fe, 2004. Argentina.

Membership

- International Association for Computational Mechanics (IACM).
- Argentinian Association for Computational Mechanics (AMCA).
- Organising Committee of the XV Congress on Numerical Methods and their Applications. ENIEF 2006. Argentina.
- Organising Committee of the First South-American Congress on Computational Mechanics. MECOM 2002. Argentina.
- Department of Informatics. Universidad Nacional del Litoral. Argentina.

Diffusion

- Coupled Large Scale Surface and GroundWater Flow. TV Emission *"A ciencia cierta"*. Santa Fe, Argentina. December, 2005.
- Newspaper article: *A Powerfull Technological Tool to Tackle the Hydrological Problem in Santa Fe, Argentina*. Article appeared in the regional newspaper "El Litoral". Santa Fe, June, 15 2003.

Courses

Courses taken at Université Pierre et Marie Curie-Paris VI. Faculté de Sciences Jean Monnet - Université de Saint-Etienne.

1. Stage de Travaille à la Université de Saint-Etienne: **"Essais Numériques de la Méthode de Décomposition Asymptotique de Domaine".**
2. "Aspect Matématiques des Méthodes Variationnelles en Mécanique". Prof. V. Ruas. Laboratiore de Modélisation en Mécanique. Université de Saint-Etienne.
3. "Résolution Approché des Problèmes Variationnels de la Mécanique". Prof. V. Ruas. Laboratiore de Modélisation en Mécanique. Université de Saint-Etienne.
4. "Calcul Avancé en Algébre Linéaire at Calcul Parallèle". Prof. K. Taubert. Universität Hamburg, Allemagne.
5. "Méthodes de Calcul en Dynamique des Systèmes Multicorps". Prof. J. A. Ambrosio. Instituto Superior Técnico. Lisboa, Portugal.
6. "Algorithmes Numériques en Mécanique de Fluides". Prof. L. QUARTAPELLE. Istituto Politécnico di Milano, Italie.

Courses taken at Universidad Nacional del Litoral. Argentina.

1. "Introduction to the Scientific Computation in Parallel Computers". Prof. V. Sonzogni, Dr. M. Storti.
2. "Fluid Mechanics". Dr. J. Deiber, Dr. R. Bortollozi.
3. "An Introduction to the Finite Element Method". Dr. A. Cardona, Dr. M. Storti, Dr. A. Huespe, Dr. J. D'elia.
4. "Computational Hydraulics". Dr. C. Vionnet.
5. "Applied Mathematics". Dr. Costanza.
6. "Topics on Turbulence". Dra. B. Camaño Schettini.

Others

1. COSMOS/M "Basic Trainning Course" and "Advanced Seminar Course". Structural Analysis Corp. Instituto Universitario Aeronáutico. Córdoba. Año 1999.
2. The Dornier Do-228. model for the "Advanced Aircraft Analysis" program. Universidad Nacional de Córdoba. Año 1998.
3. "Dangerous Wares for Aerial Transportation". Departamento de Coordinación y Control de la Comisión de Prevención de Accidentes de Aviación Civil. Universidad Nacional de Córdoba. Año 1997.

Areas of interest

- Computational Fluid Dynamics.
- Numerical methods, finite elements.
- Large Scale Linear Systems Solvers.
- Domain Decomposition Methods.
- Numerical simulation of the stream/aquifer interaction.
- Numerical simulation of the Navier-Stokes equations.
- Implementation of finite element programs with parallel programming in Beowulf class clusters (GNU/Linux OS) using MPI/PETSc messages passing libraries.
- Free and forced vibrations of two-dofs mass-spring systems attached to a plate.
- Structural Dynamics of Micro-satellites.

- Transonic and Supersonic Flight Dynamic.
- Object Oriented Programming in C/C++.
- Extension Languages (Perl, Scheme).
- λ-Programming in Haskell.
- OOP in Pascal and Structured programming in Fortran.

Maintainer.

- **"Continuum Mechanics"** grade course web page at Facultad de Ingeniería y Ciencias Hídricas. Universidad Nacional del Litoral. `http://venus.ceride.gov.ar/mc`.

- **"Introduction to Tensor Calculus and their Applications on Continuum Mechanics"** PhD. course web page at Facultad de Ingeniería y Ciencias Hídricas. Universidad Nacional del Litoral. `http://venus.ceride.gov.ar/tensores`.

- **"Algorithms and Data Structures"** course web page at Facultad de Ingeniería y Ciencias Hídricas. Universidad Nacional del Litoral. `http://venus.ceride.gov.ar/aed`.

- Web Page of the Code: **"PETSc-FEM: A General Purpose, Parallel, Multi-Physics FEM Program"**. `http://www.cimec.org.ar/petscfem`.