

# Hermann Mena

*Prof. Dr. habil.*

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## Personal Information

Date of Birth April 9, 1979  
Place of Birth Otavalo, Ecuador  
Citizenship Ecuadorian

## Education

- 06/2016 **Habilitation\* (habil.)** in Mathematics at University of Innsbruck, Austria  
Title of Habilitation Thesis: *Linear Quadratic Optimization of Stochastic Partial Differential Equations: Theory and Numerical Approximation.*  
First Reviewer: Prof. Dr. Gianmario Tessitore,  
Second Reviewer: Prof. Dr. Stevan Pilipović,  
Third Reviewer: Prof. Dr. Tobias Damm,  
Fourth Reviewer: Prof. Dr. Volker Mehrmann.  
\*Highest qualification level issued by a University. Habilitation is a higher degree than PhD.
- 08/2007 **Doctor of Philosophy (Ph.D./Dr. rer. nat.)** in Applied Mathematics at Escuela Politécnica Nacional, Ecuador; partnership program with Technische Universität Berlin, Germany  
Title of Dissertation: *Numerical Solution of Differential Riccati Equations Arising in Optimal Control Problems for Parabolic Partial Differential Equations.*  
Adviser: Prof. Dr. Peter Benner,  
Second Examiner: Prof. Dr. Heike Faßbender.
- 03/2003 **Bachelor** in Pure Mathematics at Escuela Politécnica Nacional, Ecuador  
Title of Thesis: *Multiple solutions for some inhomogeneous nonlinear elliptic problems.*

## Research Interests

Applied Mathematics, Stochastic Control, Numerical analysis, Computational Science, Linear Quadratic Optimization, Parallel and Distributed Systems.

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## Professional Record

- 02/2021 – **Humboldt Fellow**, *Technische Universität Berlin*, Berlin, Germany.  
present
- 08/2019 – **Rector**, *Yachay Tech*, San Miguel de Urququí, Ecuador.  
12/2020
- 08/2019 – **Head of the Board of Trustees**, *Yachay Tech*, San Miguel de Urququí, Ecuador.  
12/2020
- 06/2019 – **Member of the Board of Trustees**, *Yachay Tech*, San Miguel de Urququí, Ecuador.  
12/2020
- 09/2016 – **Professor**, *Department of Mathematics*, *Yachay Tech*, San Miguel de Urququí,  
12/2020 Ecuador.
- 01/2013 – **Universitätsassistent**, *Numerical Analysis, Department of Mathematics, University  
08/2016 of Innsbruck*, Innsbruck, Austria.
- 01/2008 – **Associate Professor**, *Tenure granted in 01/2009, Department of Mathematics,  
12/2012 Escuela Politécnica Nacional*, Quito, Ecuador.
- 01/2009 – **Scientific Visitor**, *Long term*.  
04/2009 Massachusetts Institute of Technology (MIT), Cambridge (MA) USA. Department of  
Mathematics, Applied Mathematics and Scientific Computing, Host: Prof. Gilbert Strang  
(Spring term 2009)
- 2008 – 2017 **Scientific Visitor**, *Short term*.
- University of Kaiserslautern, Kaiserslautern, Germany, October 2017 (two weeks), October 2014 (one week).
  - Technische Universität Berlin, Berlin, Germany, July 2017 (one week), October 2016 (one week) and February 2015 (one week).
  - Max Planck Institute for Dynamics of Complex Technical Systems, Magdeburg, Germany, August 2017 (one week), May 2016 (one week), May 2014 (one week), August 2013 (one week), June 2012 (two months) and June 2011 (two months).
  - Universidad de Buenos Aires, Buenos Aires, Argentina, March 2017 (two weeks) and October 2009 (one week).
  - Massachusetts Institute of Technology (MIT), Cambridge, USA, March 2017 (one week).
  - Temple University, Philadelphia, USA, February 2017 (one week) and October 2015 (one week).
  - RICAM, Austrian Academy of Sciences, Linz, Austria, February 2017 (one week) and February 2016 (one week).
  - Universidad Carlos III, Madrid, Spain, April 2016 (one week).
  - Université Paris Dauphine, Paris, France, March 2016 (one week).
  - University of Electronic Science and Technology of China, Chengdu, China, July 2015 (Guest Lecturer for two weeks).
  - Eötvös Loránd University, Budapest, Hungary April 2015 (two weeks) and March 2014 (one week).
  - Universidad de la República, Montevideo, Uruguay, December 2014 (Guest Lecturer for two weeks), September 2011 (one week).

- Serbian Academy of Sciences and Arts, Belgrade, Serbia, November 2014 (three days).
- Lund University, Lund, Sweden, May 2014 (one week).
- Josip Juraj Strossmayer University of Osijek, Croatia October 2013 (Guest Lecturer for two weeks).
- Chemnitz University of Technology, Chemnitz, Germany May 2010 (two months), May 2009 (two months) and May 2008 (two months).
- Universidad Jaime I, Castellón, Spain February 2010 (one month).

01/2007 – **Postdoctoral Position**, *Chemnitz University of Technology*, Chemnitz, Germany.  
12/2007

2003 – 2007 **Research Visit**, *Short term*.

- Weierstrass Institute for Applied Analysis and Stochastics WIAS, Berlin, Germany August 2007 (one week).
- Universidad Jaime I, Castellón, Spain, October 2007 (two weeks).
- Chemnitz University of Technology, Chemnitz, Germany May 2006 (two months), May 2005 (two months) and May 2004 (two months).
- Technische Universität Berlin, Berlin, Germany May 2003 (two months).

10/2001 – **Teaching Assistant, Scientific Assistant and Lecturer**, *Department of Mathematics, Escuela Politécnica Nacional*, Quito, Ecuador.  
12/2006

10/1999 – **Teacher of Mathematics**, *“Gonzalo Zaldumbide” High School*, Quito, Ecuador.  
09/2000

## Academic Management

06/2019 – **Member of the Board of Trustees**.

12/2020 Yachay Tech, San Miguel de Urququí, Ecuador.

06/2011 – **Revista ELEMENTOS**.

06/2016 Member of the Editorial Board.

06/2017 – **Head of a Committee**.

04/2019 For setting up a master and PhD program at the Faculty of Mathematical and Computational Sciences at Yachay Tech

09/2017 **SIAM Student Chapter at Yachay Tech**.

Founding mentor and Faculty Adviser of the Society for Industrial and Applied Mathematics (SIAM) Student Chapter at Yachay Tech.

07/2019 **Minisymposium on Low-rank methods for matrix- and operator-valued differential equations**.

SciCADE 2019 International Conference on Scientific Computation and Differential Equations, Innsbruck, Austria, July 2019.

07/2017 **Minisymposium on Closed-Loop Control for Infinite Dimensional Systems and Applications**.

2017 SIAM Conference on Control and Its Applications, Pittsburg, USA, July 2017.

- 07/2016 **Minisymposium on Matrix Equations: Solvers and Applications.**  
7th European Congress of Mathematics, Berlin, Germany, July 2016.
- 10/2015 **Minisymposium on Matrix Equations in Control Theory Optimal Control.**  
SIAM Conference on Applied Linear Algebra, Atlanta, USA, October 2015.
- 08/2012 **XIII Encuentro de Matemáticas y sus Aplicaciones.**  
Member of the Scientific Committee. Quito Ecuador, July 30- August 3 2012.

## Funded Research Projects as Principal Investigator

- 01/2020 – **Traffic Simulation of Otavalo City.**  
09/2020 Funded by: Otavalo City Council.  
Developed at: Yachay Tech, San Miguel de Urucuquí, Ecuador  
Grant: 130 000 USD
- 10/2015 – **Solution of large-scale Lyapunov differential equations.**  
08/2019 Funded by: FWF Austrian Science Foundation (P 27926 Einzelprojekte)  
Developed at: University of Innsbruck, Innsbruck, Austria  
Grant: 157 529,40 Euros  
Url: <http://pf.fwf.ac.at/en/research-in-practice/project-finder/35070>
- 08/2014 – **Numerical methods in Simulation and Optimal Control.**  
08/2016 Funded by: University of Innsbruck, Innsbruck, Austria  
Developed at: University of Innsbruck, Innsbruck, Austria  
Partner: Department of Sport Science, University of Innsbruck, Innsbruck, Austria  
Grant: 7 040 Euros
- 03/2014 – **Numerical solution of optimal control problems for the Shallow water**  
03/2016 **equation.**  
Funded by: AKTION research sterreich-Ungarn Wissenschafts- und Erziehungskooperation  
Developed at: University of Innsbruck, Innsbruck, Austria  
Partner: Eötvös Loránd University, Budapest, Hungary  
Grant: 3 500 Euros
- 11/2008 – **Simulation of the Glyphosate Aerial Spray Drift at the Ecuador-Colombia**  
06/2012 **Border.**  
Funded by: SENESCYT and Escuela Politécnica Nacional, Quito, Ecuador  
Developed at: Escuela Politécnica Nacional, Quito, Ecuador  
Partner: Chemnitz University of Technology, Chemnitz, Germany  
Grant: 203 026.8 USD  
(part of this grant served to set up a Supercomputing Center for the Department of Mathematics at Escuela Politécnica Nacional)
- 07/2012 – **Visualization and Diagnosis of Pigmented Lesions.**  
07/2013 Funded by: Escuela Politécnica Nacional, Quito, Ecuador  
Developed at: Escuela Politécnica Nacional, Quito, Ecuador  
Partner: Department of Dermatology, Hospital "Carlos Andrade Marin", Quito, Ecuador  
Grant: 5 085.50 USD

## Teaching

### 2016-2019 Courses taught at Yachay Tech, Ecuador:.

- Advance Linear Algebra\*
- Discrete Mathematics\*
- Optimal Control: Principles and Computations\*
- Inverse Problems\*
- Research Seminar

\*undergraduate level.

### 2013 –2016 Courses taught at University of Innsbruck, Austria:.

- 702871 Numerical Methods for Linear Control Systems SS13\*
- 702711 Numerische Mathematik WS13 \*
- 702826 Optimal Control: Principles and Computation SS14\*
- 702117 PS Analysis 1 WS14\*\* (two groups),
- 702561 Seminar mit Bachelorarbeit WS14\*\*,
- 706011 Computational Methods in Physics and Astrophysics SS15\*
- 702432 Numerische Mathematik 2 SS15\*.
- 702117 PS Analysis 1 WS15\*\* (two groups),
- 702561 Seminar mit Bachelorarbeit WS15\*\*,
- 706011 Computational Methods in Physics and Astrophysics SS16\*
- 702117 PS Analysis 2 SS16\*\* (two groups),
- 702561 Seminar mit Bachelorarbeit SS16\*\*,

\*graduate level, \*\*undergraduate level, WS: winter semester, SS: summer semester.

### 07/2015 Courses taught at University of Electronic Science and Technology of China, Chengdu, China:.

- Optimal Control of Systems Governed by (S)PDEs: Theory and Numerical Solution. Guest lecturer at the Summer International School 2015.  
Twenty two courses were given by foreign professors from eleven countries in all areas. I was appointed to give a two-week course at the Department Mathematics.  
(40 hours course in two weeks. It included lectures, exercises and evaluation)

### 12/2014 Courses taught at Universidad de la República, Uruguay:.

- Large-Scale Linear Quadratic Optimization.  
Guest lecturer at the Department of Computer Science within the PhD and Master program.  
(20 hours course in one week. It included lectures, exercises and evaluation)

### 10/2013 Courses taught at Josip Juraj Strossmayer University of Osijek, Croatia:.

- Large-Scale Simulation and Control.  
Guest lecturer at the Department of Mathematics within the PhD and Master program.  
(30 hours course in two weeks. It included lectures, exercises and evaluation)

2003 – 2012 **Courses taught at Escuela Politécnica Nacional, Ecuador:**

- Analysis II (2004-I),
- Logic and Set Theory (2005-I),
- Logic and Set Theory (2005-II),
- Numerical Analysis II (2006-I, two groups),
- Logic and Set Theory (2005-II),
- Functional Analysis (2007-I)
- Linear Algebra (2008-II),
- Numerical Linear Algebra (2008-II),
- Seminar for Bachelor thesis (2008-II),
- Functional Analysis (2009-I),
- Introduction to Number Theory (2009-I),
- Numerical Analysis II (2009-II),
- Biomathematics (2009-II)
- Math for the Environment (2010-I),
- Seminar for Bachelor thesis (2010-I),
- Topics in Econometrics (2010-I),
- Functional Analysis (2010-II),
- Numerical Analysis for PDEs (2010-II),
- Math for the Environment (2010-II),
- Functional Analysis (2011-I),
- Numerical Analysis for PDEs (2011-I),
- Functions of a Complex Variable (2011-II),
- Numerical Analysis II (2012-I),
- Biomathematics (2012-I),
- Functions of a Complex Variable (2012-A),
- Functional Analysis (2012-A),

I: first semester , II: second semester, A: first semester, of the academic year.

All courses where either six or four hours per week. They included lectures and exercises.

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## Journal Review Activities

- SIAM Journal on Matrix Analysis and Applications,
- SIAM Journal on Scientific Computing,
- IEEE Transactions on Control Systems Technology,
- IEEE Transactions on Automatic Control,
- IEEE Transactions on Neural Networks and Learning Systems,
- IEEE Conference on Decision and Control,
- Computational and Applied Mathematics,
- Optimization Methods and Software
- Numerical Algorithms,
- International Journal of Computer Mathematics,
- Computer Physics Communications,
- ELEMENTOS,
- Journal of Computational and Applied Mathematics,
- Electronic Transitions on Numerical Analysis ETNA,

- Mathematical Methods in the Applied Sciences,
- Advances in Difference Equations,
- Applicable Algebra in Engineering Communication and Computing,
- Algorithms,
- The Journal of Supercomputing-Springer.

## Publications

### Books

1. T. Levajković and H. Mena, *Equations Involving Malliavin Calculus Operators: Applications and Numerical Approximation*, Springer Briefs, 125 pages, ISBN: 978-3-319-65678-6, (2017).
2. P. Benner, H. Mena and R. Schneider, *Modelo para las aspersiones con glifosato: frontera Ecuador-Colombia* (in Spanish), Shaker-Verlag, Aachen, 208 pages, ISBN: 978-3-8440-3061-7, (2014).
3. H. Mena, *Numerical Solution of Differential Riccati Equations Arising in Optimal Control Problems for Parabolic Partial Differential Equations*, Unidad de Publicaciones de la Facultad de Ciencias, First edition, Quito-Ecuador, 175 pages, ISBN: 978-9978-383-09-4, (2012).

### Refereed Articles in Journals

4. H. Mena, L. Pfurtscheller and M. Voigt, *Discounted cost linear quadratic Gaussian control for descriptor systems*, International Journal of Control, (2020). DOI: 10.1080/00207179.2020.1854865
5. A. Kofler, T. Levajkovic, H. Mena and A. Ostermann, *A splitting/polynomial chaos expansion approach for stochastic evolution equations*, Journal of Evolution Equations, (2020). DOI: 10.1007/s00028-020-00627-5
6. H. Mena and A. Koskela, *Analysis of Krylov Subspace. Approximation to Large Scale Differential Riccati Equations*, Electronic Transactions on Numerical Analysis, 52: 431-454, (2020). DOI: 10.1553/etna-vol52s431
7. H. Mena, L. Pfurtscheller and J. Romero-Leiton, *Random perturbations in a mathematical model of bacterial resistance: Analysis and optimal control*, Mathematical Biosciences and Engineering, 17(5): 4477-4499, (2020) DOI: 10.3934/mbe.2020247
8. H. Mena, L. Pfurtscheller and T. Stillfjord, *GPU acceleration of splitting schemes applied to differential matrix equations*, Numerical Algorithms, (2019). DOI: 10.1007/s11075-019-00687-w.
9. H. Mena and L. Pfurtscheller, *An efficient SPDE approach for El Niño*, Applied Mathematics and Computation, 352(1) (2019), pp. 146-156. DOI: 10.1016/j.amc.2019.01.071.
10. T. Levajkovic, H. Mena and L. Pfurtscheller, *Solving Stochastic LQR Problems by Polynomial Chaos*, IEEE Control Systems Letters, 2(4), pp. 641-646, (2018), DOI: 10.1109/LCSYS.2018.2844730.

11. H. Mena, L. Pfortscheller, C. Piazzola and A. Ostermann, *Numerical low-rank approximation of matrix differential equations*, Journal of Computational and Applied Mathematics, 340, pp. 602-614, (2018), DOI: 10.1016/j.cam.2018.01.035.
12. P. Csomos and H. Mena, *Fourier-Splitting Method for Solving Hyperbolic LQR Problems*, Numerical Algebra Control and Optimization, 8(1), pp. 17-46, (2018), DOI: 10.3934/naco.2018002.
13. P. Benner and H. Mena, *Numerical solution of the infinite-dimensional LQR-problem and the associated Riccati differential equations*, J. Numer. Math., 26(1), pp. 1-20, (2018), DOI: 10.1515/jnma-2016-1039.
14. I. Lasiecka, T. Levajković, H. Mena, A. Tuffaha and C. Hafizoglu, *The Stochastic Linear Quadratic Control Problem with Singular Estimates*, SIAM Journal on Control and Optimization, 55(2), pp. 595 - 626 (2017). DOI: 10.1137/16M1056183
15. T. Damm, H. Mena and T. Stillfjord, *Numerical Solution of the Finite-Time Stochastic Linear Quadratic Control Problem*, Numer Linear Algebra with Applications, 24(4) (2017); e2091, DOI: 10.1002/nla.2091.
16. T. Levajković, H. Mena and A. Tuffaha, *A Numerical Approximation Framework for the Stochastic Linear Quadratic Regulator Problem on Hilbert Spaces*, Applied Mathematics and Optimization, 75(3), pp. 499-523, (2017), DOI: 10.1007/s00245-016-9339-3.
17. T. Levajković, H. Mena and M. Zarfl, *Lévy processes, Subordinators and Crime Modelling*, Novi Sad Journal of Mathematics NSJOM, 46(2) (2016), pp. 65–86.
18. R. Altmann, H. Mena and T. Levajković, *Operator Differential Algebraic Equations with Noise Arising in Fluid Dynamics*, Monatshefte für Mathematik, 182(4), pp. 741-780, (2016), DOI: 10.1007/s00605-016-0931-z
19. T. Levajković, H. Mena and A. Tuffaha, *The Stochastic Linear Quadratic Control Problem: A Chaos Expansion Approach*, Evolution Equations and Control Theory, 5(1) (2016), pp. 105 - 134, DOI: 10.3934/eect.2016.5.105.
20. P. Benner, H. Mena and R. Schneider, *Modelling of the Glyphosate Aerial Spray Drift at the Ecuador-Colombia border*, Applied Mathematical Modelling, 40 (2016), pp. 373–387, DOI:10.1016/j.apm.2015.04.057.
21. P. Benner, H. Mena and R. Schneider, *Drogen, Herbizide und numerische Simulation*, Mitteilungen der Deutschen Mathematiker-Vereinigung. Volume 23, Issue 4, (2015), pp. 222–225, DOI: 10.1515/dmvm-2015-0084.
22. H. Mena, N. Lang and J. Saak, *On the benefits of the LDL factorization for large-scale differential matrix equation solvers*, Linear Algebra and its Applications, Vol. 480 (2015), pp. 44-71, DOI:10.1016/j.laa.2015.04.006.
23. H. Mena and P. Fuenmayor, *Fuzzy Hybrid System for Forecasting Financial Time Series*, AESTIMATIO The IEB International Journal of Finance, (2015), II: pp. : 78-91, DOI:10.5605/IEB.11.3.
24. P. Benner, P. Ezzatti, H. Mena, E.S. Quintana-Ortí and A. Remón, *Solving Matrix Equations on Multi-core and Many-core Architectures*, Algorithms (2013), 6(4), pp. 857-870, DOI:10.3390/a6040857.
25. P. Benner and H. Mena, *Rosenbrock methods for solving differential Riccati equations*, IEEE Transactions on Automatic Control, Vol. 58, No. 11, (2013), pp. 2950-2957, DOI:10.1109/TAC.2013.2258495.



26. P. Benner, P. Ezzatti, H. Mena, E.S. Quintana-Ortí and A. Remón, *HPC en simulación y control a gran escala*, Revista ELEMENTOS, Vol. 3, No. 3, (2013), pp. 1-27, ISSN: 2248-5252.
27. P. Benner, H. Mena and J. Saak, *On the parameter selection problem in the Newton-ADI iteration for large scale Riccati equations*, Electronic Transitions on Numerical Analysis ETNA, Vol. 19 (2008), pp. 136-149, ISSN 1068-9613.
28. H. Mena and M. Calahorrano, *Remarks on nonlinear inhomogeneous elliptic problems arising in astrophysics*, E. J. of Qualitative Theory of Diff. Equ., No. 19 (2005), pp. 1-12, ISSN 1417-3875.
29. H. Mena and M. Calahorrano, *Multiple solutions for inhomogeneous nonlinear elliptic problems arising in astrophysics*, Electron. J. Diff. Eqns., Vol. 2004 No. 49 (2004), pp. 1-10, ISSN 1072-6691.

### Book Chapters

30. T. Levajković, H. Mena and A. Tuffaha, *The Stochastic LQR Optimal Control with Fractional Brownian Motion*, Generalized Functions and Fourier Analysis, Operator Theory: Advances and Applications, accepted for publication Springer 2016.
31. P. Csomos and H. Mena, *Innovative Integrators for Computing the Optimal State in LQR Problems*, Lecture Notes in Computer Science, accepted for publication Springer International Publishing 2016.
32. T. Levajković and H. Mena, *Equations involving Malliavin derivative: a chaos expansion approach*, In S. Pilipovic, J. Toft (Eds.), Pseudo-Differential Operators and Generalized Functions, Operator Theory: Advances and Applications, Vol. 245, pp. 197-214, Springer International Publishing 2015.
33. T. Levajković and H. Mena, *On Deterministic and Stochastic Linear Quadratic Control Problems*, Current Trends in Analysis and Its Applications, Trends in Mathematics, Research Perspectives, pp. 315-322, Springer International Publishing Switzerland 2015.

### Refereed Articles in Conference Proceedings

34. P. Benner, E. Dufrechou, P. Ezzatti, H. Mena, E.S. Quintana-Ortí and A. Remón, *Numerical Solution of Finite-Time Linear-Quadratic Control Problems on Hybrid CPU-GPU Platforms*, Computational Science and Its Applications – ICCSA 2017, Proceedings Part I, Springer International Publishing (2017) pp. 116–132, DOI: 10.1007/978-3-319-62392-4\_9
35. R. Bayá, I. Decia, P. Ezzatti and H. Mena, *Accelerating the resolution of generalized Lyapunov matrix equations on hybrid architectures*, The 2016 International Conference on High Performance Computing & Simulation (HPCS 2016), Innsbruck, 2016, pp. 653-658, DOI: 10.1109/HPCSim.2016.7568397

36. J. Denißen, H. Mena, A. Koskela and Z. Tomljanović, *Damping optimization in vibrational systems based on amplitude*, Proceedings of the 21st International Symposium on Mathematical Theory of Networks and Systems MTNS 2014, (2014), pp. 1222-1227, ISBN: 978-90-367-6321-9.
37. P. Benner, P. Ezzatti, H. Mena, E.S. Quintana-Ortí and A. Remón, *Solving Differential Riccati Equations on Multi-GPU Platforms*, In J. Vigo-Aguilar (Ed.), Proceedings of the 11th International Conference on Computational and Mathematical Methods in Science and Engineering, CMMSE 2011, Vol. 1 (2011), pp. 178-188, ISBN: 978-84-614-6167-7.
38. P. Benner, P. Ezzatti, H. Mena, E.S. Quintana-Ortí and A. Remón, *Numerical Solution of Differential Riccati Equations on Hybrid CPU-GPU Platforms*, In Proceedings of ALAMA2010 - 2nd Meeting on Linear Algebra, Matrix Analysis, and Applications, (2010), pp. 1-7, ISBN: 978-84-8363-544-5.
39. P. Benner and H. Mena, *BDF Methods for Large-Scale Differential Riccati Equations*, In B. De Moor, B. Motmans, J. Willems, P. Van Dooren, V. Blondel (editors), Proceedings Sixteenth International Symposium on: Mathematical Theory of Network and Systems MTNS 2004, (2004), ISBN 90-5682-517-8.

### Theses

40. *Linear Quadratic Optimization of Stochastic Partial Differential Equations: Theory and Numerical Approximation*, Habilitation Thesis, Department of Mathematics, University of Innsbruck, Austria, June 2016.
41. *Numerical Solution of Differential Riccati Equations Arising in Optimal Control Problems for Parabolic Partial Differential Equations*, Dissertation, Department of Mathematics, Escuela Politecnica Nacional, Ecuador; partnership program with TU Berlin, Germany, August 2007.
42. *Soluciones múltiples para cierto tipo de problemas elípticos no lineales que aparecen en Astrofísica*, Diploma Thesis, Department of Mathematics, Escuela Politecnica Nacional, Ecuador, March 2003.

### Other Publications

43. P. Benner, H. Mena and R. Schneider, *Drugs, Herbicides, and Numerical Simulation*, Snapshots of modern Mathematics from Oberwolfach, No. 11/2013, 9 pages, September (2014), DOI 10.14760 / SNAP-2013-011-EN.
44. H. Mena, N. Lang and J. Saak, *LDL-ADI based algorithms for large scale differential matrix equations*, Proceedings in Applied Mathematics and Mechanics : Volume 14, Issue 1, pp. 827–828, WILEY-VCH Verlag, (2014), DOI: 10.1002/pamm.201410394.
45. H. Mena and R. Cajamarca, *Modelación de series económicas mediante métodos automáticos de regresión difusa*, Analitika, Revista de Análisis Estadístico, 3 (2012), Vol. 3(1): 19-38.

46. H. Mena and J. Saak, *Simulación numérica de circuitos eléctricos a gran escala*, Proceedings of the XXII Jornadas de Ingeniería Eléctrica y Electrónica, (2009), pp. 147-155, ISBN 978-9978-383-00-1.
47. H. Mena and R. Cajamarca, *Métodos automáticos de regresión difusa aplicados a datos económicos*, Memorias del Primer Congreso Científico Internacional en Economía y Finanzas, (2009).
48. H. Mena and P. Fuenmayor, *Inteligencia computacional en la modelación de series financieras: enfoque de la lógica difusa*, Memorias del Primer Congreso Científico Internacional en Economía y Finanzas, (2009).
49. H. Mena, *Computational Challenges in Simulation and Control of Industrial Process*, Proceedings of the IV Jornadas de Informática ISIC 2008, (2008), pp. 49-56, ISBN 978-9978-92-592-8).
50. P. Benner and H. Mena, *Numerical Solution of Differential Riccati Equations arising in Optimal Control for parabolic PDEs*, Proceedings in Applied Mathematics and Mechanics: Vol. 7, Issue 1; Wiley InterScience; (2008), ISSN 1617-7061.

## Software

51. **Visualization and Diagnosis of Pigmented Lesions VDPL 1.0.**  
Free-portable software, which can be used with or without a dermatoscope and a personal photo camera to visualize, monitor and diagnosis pigmented lesions.
52. **Automated Fuzzy Regression Methods.**  
In the script for R some automated fuzzy regression methods are implemented. Particularly, it contains routines for: Batch Least Squares, Recursive Batch Least Squares, Modified Learning from Example and Combined Recursive Batch Least Squares. The methods were implemented exploiting the structure of some applications in Economy which are usually modeled by standard regression.
53. **Fuzzy Hybrid System for Modelling Time Series.**  
In the script for R a Fuzzy Hybrid System for Modelling Time Series is implemented. The system is based on SARIMA models and uses the forecast package from R. The best model is chosen considering the forecasting of the models after clustering them using fuzzy c-means algorithm. The system has given good results in Finance applications

## Honors

- 2015 Appointed as lecturer at the Summer International School, University of Electronic Science and Technology of China, Chengdu (twenty two courses were given by international professors from eleven countries in all areas. I was uncharged of the course at the Department of Mathematics)
- 2015 Invited to the 3rd Heidelberg Laureate Forum.
- 2014 Invited to give a talk at the 2nd Heidelberg Laureate Forum within Hot Topic session.
- 2009 Scientific Visitor at Massachusetts Institute of Technology (MIT), Cambridge (MA), USA.

- 2007 First Ecuadorian receiving the Ph.D. in Mathematics from a University of Ecuador.
- 2003 The results of my Bachelor thesis were published in international recognized refereed journals. I am still the only undergraduate student from the Department of Mathematics at Escuela Politecnica Nacional (Ecuador) accomplishing this since the Department was founded in 1979.
- 2012 Member of the Imbabura province triathlon team (Ecuador).

## Scholarships, Stipends and Travel Awards

### For short term research visits.

- German Academic Exchange Service DAAD (3x),
- International Mathematical Union (4x),
- Spanish National Science Foundation (Spain) (2x),
- Uruguay Science Foundation (Uruguay) (2x),
- Ecuadorian Science Foundation (Ecuador),
- National Science Foundation (USA).

### For summer schools and conferences.

- International Mathematical Union (2x),
- Latin America Mathematical Union UMALCA (4x),
- Centre International de Mathématiques Pures et Appliquées CIMPA (3x)

## Awards

### Research

- 09/2002 **UNESCO prize and French Embassy prize.**  
Best research at 10th Encuentro de Cálculo Numérico, Quito, Ecuador.
- 06/1993 **Best Research.**  
Contest of Science at "Spellman" High School, Quito, Ecuador.

### Sport Activities

- 04/2012 **6th place overall.**  
Cojimíes Triathlon 113 km (Ironman 70.3), Cojimíes, Manabí, Ecuador. Second place in the age group 30-34.
- 10/2011 **Bronze medal.**  
IV Galapagos Triathlon, Puerto Ayora, Galápagos, Ecuador. Age group 30-34.
- 07/1999 **Vice-champion Chess.**  
Tournament of Escuela Politécnica Nacional, Quito, Ecuador.
- 06/1995 **Best Sportsman of the Year.**  
"Spellman" High School, Quito, Ecuador. I won medals in the Quito High School Championship of: Basketball, Swimming and Chess.
- 05/1993 **Silver and bronze medal.**  
"Copa Batán" (selection process for the national swimming team), Quito, Ecuador.

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## Supervision of Ph.D. theses

- 2020 Lena-Maria Pfurtscheller, *Simulation and Optimal Control of Linear Partial Differential Equations*, University of Innsbruck, Innsbruck, Austria.
- 2019 Chiara Piazzola, *Numerical Solution of large-scale Lyapunov Differential Equations*, University of Innsbruck, Innsbruck, Austria. (co-supervision)

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## Review of Ph.D. theses

- 09/2017 Yolanda Rocío Rodríguez Cruz, *Model Reduction for Stochastic and Bilinear Systems*, Technische Universität Kaiserslautern, Germany
- 09/2011 Pablo Ezzati, *Aceleración de métodos para la resolución de problemas de reducción de modelos mediante procesadores gráficos*, Universidad de la República, Montevideo, Uruguay

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## Supervision of Master theses

- 11/2016 Lena Pfurtscheller, *A Comparison of Stochastic Models for El Niño*, University of Innsbruck, Austria.
- 10/2015 Johannes Schwaighofer, *Optimal Control for the Shallow Water Equations*, University of Innsbruck, Austria.

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## Review of Master theses

- 10/2014 Ernesto Dufrechou, *Aceleración de métodos de reducción de modelos dispersos en arquitecturas multi/many-core*, Universidad de la República, Montevideo, Uruguay

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## Supervision of Bachelor theses

- 08/2016 Hannes Claut, *Malliavin Calculus and its Applications to Finance*, University of Innsbruck, Austria.
- 08/2016 Lukas Lamplmayr, *Simulation and Optimal Control for Crime Modelling*, University of Innsbruck, Austria.
- 08/2015 Martin Zarfl, *Crime Modelling with Lévy Flights*, University of Innsbruck, Austria.
- 02/2016 Lila Petroccki, *Hermite Polynomials and Wiener Chaos Expansions*, University of Innsbruck, Austria.
- 07/2012 Paúl Cajamarca, *Regresión automática difusa aplicada a datos económicos*, Escuela Politécnica Nacional, Quito, Ecuador.

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## Membership in Professional Societies

- Society of Industrial and Applied Mathematics SIAM.
- Austrian Mathematical Society.
- American Mathematical Society.

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## Relevant Invited Lectures

- 12/2018 Solving Stochastic LQR Problems by Polynomial Chaos, 2018 IEEE Conference on Decision and Control, Miami, FL, USA.
  - 06/2017 Optimal Control of Stochastic PDEs: Theory, Numerical Approximation and Applications, Semiplenary talk at XXI Congreso Colombiano de Matemáticas, Bogota, Colombia.
  - 03/2017 Optimal Control of Stochastic PDEs with Applications, SIAM-CCE Invited Speaker, Massachusetts Institute of Technology (MIT), Cambridge (MA), USA.
  - 05/2016 Drugs, Herbicides, and Numerical Simulation: How Mathematical Research was applied in a Political Conflict, Magdeburg Long Night of Sciences, Max Planck Institute, Magdeburg, Germany.
  - 09/2014 How Herbicides Advanced Applied Math in Ecuador, Hot Topic session at the Heidelberg Laureate Forum HLF, Heidelberg, Germany.
- Since 2002 I gave more than eighty talks at conferences, workshops, minisymposia, colloquiums and seminars in Europe and USA, e.g. at the Applied Math Colloquium of the Massachusetts Institute of Technology, the Heidelberg Laureate Forum, etc. A complete list of talks can be found in my personal website.

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## Press Releases

Previously my appointment as Rector of Yachay Tech, due to my academic achievements, projects and sport victories twenty two press releases have appeared on *German Regional Newspapers, Research Magazines, Online Magazines, Ecuadorian National Magazines, Ecuadorian National Newspapers and University Magazines*. *Links to these press releases can be found in my personal website.*

- 01/2017 **All about Passion for Mathematics and Ecuador.**  
[Yachay Tech News](#), Ecuador.
- 02/2016 **A mathematician finds his way through adversity.**  
[Sciences Careers](#), Online Magazine.
- 02/2016 **On Hermann Mena, Ecuadorian optimal control mathematician.**  
[Math in the Media](#), American Mathematical Society.
- 03/2015 **FWF genehmigt acht Projekte.**  
[iPoint](#), Innsbruck, Austria.
- 09/2014 **Maths, coca, and talent.**  
[Heidelberg Laureate Forum Blog](#), Heidelberg, Germany.
- 09/2014 **Schlangenbeschwörern zu Python Programmierern.**  
[Heidelberg Laureate Forum Blog](#), Heidelberg, Germany.
- 01/2014 **Drogen, Herbizide und Mathematik.**  
[Zukunft Forschung](#), Innsbruck, Austria.
- 01/2014 **Mathematics in Borderlands.**  
[Max Planck RESEARCH](#), Germany.

- 04/2013 **Mathematik im Grenzbereich.**  
[Max Planck FORSCHUNG](#) , Germany.
- 02/2013 **Inevitable partida de un PhD.**  
[Magazin Vanguardia](#), Ecuador.
- 10/2012 **Los nuevos retos de un deportista politécnico.**  
[Informativo Politécnico](#), Ecuador.
- 08/2012 **Ein Indianer im Fussballtrikot.**  
[Freie Presse](#), Chemnitz, Germany.
- 06/2012 **La ciencia de hacer deporte, Hermann Mena PhD.**  
[Informativo Politécnico](#), Ecuador.
- 11/2011 **Politécnico Investigador y deportista.**  
[Informativo Politécnico](#), Ecuador.
- 05/2010 **Los algoritmos patrios.**  
[Diario El Telégrafo](#), Ecuador.
- 02/2010 **Drogen, Pflanzengift und jede Menge Mathematik.**  
[TU Spektrum](#), Chemnitz, Germany.
- 06/2009 **El estudio y la investigación marcan la vida de Hermann Mena.**  
[Informativo Politécnico](#) , Ecuador.
- 02/2008 **La ciencia ecuatoriana.**  
[Diario Hoy](#) , Ecuador.
- 10/2007 **Chemntzer helfen bei Promotion in Ecuador.**  
[Freie Presse](#), Chemnitz, Germany.
- 09/2007 **Mathematische Premiere in Ecuador.**  
[TU Spektrum](#), Chemnitz, Germany.
- 09/2007 **Erster Mathematiker mit Dokortitel.**  
[DAAD-magazin](#), Germany.
- 10/2003 **Querdenker aus Quito gesucht.**  
[TU Berlin intern](#) , Berlin, Germany.

Many press releases appeared on *national and international media* during the time that I was Rector of Yachay Tech. Most of them can be found *online*.

## Foreign Language Skills

Spanish	Native speaker
English	C1 level
German	B2 level
French	B1 level

## Computer Skills

Mathematical Software: Matlab, Mathematica, Maple, SPSS, SAS, Stata, R

Office Software for Linux and Windows,  $\LaTeX$

## Hobbies

### **Triathlon.**

Personal records: sprint (1h05'), olympic (2h23'), Ironman 70.3 (5h03')

### **Swimming.**

Personal records: 50m free style (25"), 100m free style (58"), 1.9 km open water (25')

### **Running.**

Personal records: 5.5km (19'25"), 8km (29'2"), 21km (1h35'15"), 42.195 km (3h43'50")

### **Scuba Diving.**

PADI Advanced Open Water

### **Mountaineering, Chess, Basketball, Photography, Oil Painting.**

## References

Available upon request

September 2021