

Curriculum vitae of **Carlos Mora-Corral**

Current position: Post Doctoral Fellow. Basque Center for Applied Mathematics. From 1 October 2008.

Work address

BCAM – Basque Center for Applied Mathematics.
Bizkaia Technology Park, Building 500, E-48160 Derio (Vizcaya), Spain
Email: mora@bcamath.org Web: www.bcamath.org/mora-corral
Phone number: +34 946 567 846. Fax number: +34 946 567 843.

Academic Qualifications

- Degree (Licenciatura) in Mathematics. University Complutense of Madrid. June 2000.
- PhD in Mathematics. University Complutense of Madrid. June 2004.

Previous positions

- PhD student. Faculty of Mathematical Sciences, University Complutense of Madrid. April 2001 – October 2004. Supervisor: Julián López-Gómez.
- Postdoctoral research assistant. Mathematical Institute, University of Oxford. November 2004 – September 2008. Host: John M. Ball.

Articles

Journal Articles

1. C. Mora-Corral, On the uniqueness of the algebraic multiplicity. *J. London Math. Soc. (2)* **69** (2004) 231–242.
2. J. López-Gómez and C. Mora-Corral, Counting solutions of nonlinear abstract equations, *Top. Meth. in Nonl. Anal.* **24** (2004) 307–335.
3. C. Mora-Corral, Uniqueness of the algebraic multiplicity. *Proc. Roy. Soc. Edinburgh Sect. A* **134** (2004) 985–990.
4. J. López-Gómez and C. Mora-Corral, Minimal complexity of semi-bounded components in bifurcation theory, *Nonlinear Anal.* **58** (2004) 749–777.
5. J. López-Gómez and C. Mora-Corral, Finite Laurent developments and the logarithmic residue theorem in the real non-analytic case, *Integral Equations and Operator Theory* **51** (2005) 529–552.
6. R. Magnus and C. Mora-Corral, Natural representations of the multiplicity of an analytic operator-valued function at an isolated point of the spectrum, *Integral Equations and Operator Theory* **53** (2005) 87–106.
7. J. López-Gómez and C. Mora-Corral, Counting zeros of C^1 Fredholm maps of index one. *Bull. London Math. Soc.* **37** (2005) 778–792.
8. C. Mora-Corral, Approximation by piecewise homeomorphisms of Sobolev homeomorphisms that are smooth outside a point. *Houston J. Math.* **35** (2009) 515–539.
9. J. M. Ball and C. Mora-Corral, A variational model allowing both smooth and sharp phase boundaries in solids. *Communications on Pure and Applied Analysis* **8** (2009) 55–81.

10. C. Mora-Corral, Continuum limits of atomistic energies allowing smooth and sharp interfaces in 1D Elasticity. *Interfaces and Free Boundaries* **11** (2009) 421–446.
11. J. C. Bellido and C. Mora-Corral, Approximation of Hölder continuous homeomorphisms by piecewise affine homeomorphisms. *Houston J. Math.* In press.
12. D. Henao and C. Mora-Corral, Invertibility and weak continuity of the determinant for the modelling of cavitation and fracture in nonlinear elasticity. *Arch. Rational Mech. Anal.* In press.

Articles in Conference Proceedings and Books

1. J. López-Gómez and C. Mora-Corral, Characterizing the existence of local Smith forms for C^∞ families of matrix operators. In “Trends in Banach Spaces and Operator Theory”, A. Kamińska (ed.). *Contemporary Mathematics* **321** (2003) 139–151.
2. C. Mora-Corral, Axiomatizing the algebraic multiplicity. In “The first 60 years of Nonlinear Analysis of Jean Mawhin”, pp. 175–187. (M. Delgado, A. Suárez, J. López-Gómez and R. Ortega, editors). World Scientific, 2004.
3. J. López-Gómez and C. Mora-Corral, Local Smith form and equivalence for one-parameter families of Fredholm operators of index zero. In “Spectral Theory and Nonlinear Analysis with Applications to Spatial Ecology” (S. Cano-Casanova, J. López-Gómez, C. Mora-Corral, eds.), pp. 127–161. World Scientific, 2005.
4. J. López-Gómez and C. Mora-Corral, Generalized minimal cardinal of the λ -slices of the semi-bounded components arising in global bifurcation theory. In “Nonlinear Elliptic and Parabolic Problems” (H. Brezis, M. Chipot and J. Escher, editors), pp. 329–349. Progress in Nonlinear Partial Differential Equations and their Applications **64**. Birkhäuser. Basel, 2005.
5. J. López-Gómez and C. Mora-Corral, Counting solutions in bifurcation problems. *Fundamentalnaya i Prikladnaya Matematika* **4** (2006) 149–167. Also appeared in *Journal of Mathematical Sciences* **150** (2008) 2395–2407.

Books and Edited Books

1. S. Cano-Casanova, J. López-Gómez and C. Mora-Corral (editors), *Spectral Theory and Nonlinear Analysis with Applications to Spatial Ecology*. World Scientific. Singapore, 2005.
2. J. López-Gómez and C. Mora-Corral, *Algebraic Multiplicity of Eigenvalues of Linear Operators*. Operator Theory: Advances and Applications **177**. Birkhäuser. Basel, 2007.

Preprints

1. D. Henao and C. Mora-Corral, Fracture surfaces and the regularity of inverses for BV deformations. Preprint available at www.bcamaath.org/documentos/archivos/publicaciones/HenaoMora2.pdf.
2. D. Henao and C. Mora-Corral, Lusin’s condition and the distributional determinant for deformations with finite energy. Preprint available at www.bcamaath.org/documentos/archivos/publicaciones/henaomora3pre.pdf
3. C. Mora-Corral, Explicit energy-minimizers of incompressible elastic brittle bars under uniaxial extension. Preprint available at www.bcamaath.org/documentos/archivos/publicaciones/Mora.pdf

Talks

Invited to workshops and conferences

1. Conference “Homenaje a Jean Mawhin por sus primeros 60 años de Análisis no lineal”. Faculty of Mathematics, University of Sevilla. Sevilla, Spain. 4–5 April 2003.
2. International Seminar “Spectral Theory and Nonlinear Analysis”. University Complutense of Madrid. Madrid, Spain. 14–15 June 2004.
3. Meeting “Multimat: Multi-scale modelling and characterization for phase transformations in advanced materials”. Academy of Sciences of the Czech Republic. Prague, Czech Republic. 19–21 April 2007.
4. Workshop “OxMOS / MULTIMAT Workshop on Microstructure”. University of Oxford. Oxford, UK. 2–5 September 2007.
5. Workshop BCAM-CIM’09 in Applied Mathematics. Bilbao, Spain. 2–4 July 2009.
6. Workshop “Partial differential equations, optimal design and numerics”. Centro de Ciencias Pedro Pascual. Benasque, Spain. 23 August – 4 September 2009.
7. Workshop “Atomistic models of solids”. University of Oxford. Oxford, UK. 7–8 December 2009.
8. SIAM conference “Mathematical Aspects of Materials Science”. Philadelphia, Pennsylvania, USA. 23–26 May 2010.

Invited to departamental seminars

1. Department of Mathematics, University of Iceland. Reykjavik, Iceland. 3 October 2002.
2. Applied Analysis and Mechanics Group. University of Oxford. Oxford, UK. 3 November 2003.
3. Division of Mathematics, University of Dundee. Dundee, UK. 28 November 2003.
4. Department of Mathematics, University of Strathclyde. Glasgow, UK. 1 December 2003.
5. Department of Mathematics, Heriot-Watt University. Edinburgh, UK. 3 December 2003.
6. Department of Mathematics, University of Surrey. Guildford, UK. 23 March 2007.
7. Department of Mathematics, University of Sussex. Brighton, UK. 25 October 2007.
8. Max Planck Institute for Mathematics in the Sciences. Leipzig, Germany. 4 December 2007.
9. Department of Mathematics, University of Castilla-La Mancha. Ciudad Real, Spain. 23 April 2008.
10. Department of Mathematics and Applications “R. Caccioppoli”, University of Naples “Federico II”. Naples, Italy. 28 May 2008.
11. Department of Mathematics, University of Castilla-La Mancha. Ciudad Real, Spain. 30 October 2008.
12. Department of Mathematical Analysis, University Complutense of Madrid. Madrid, Spain. 26 February 2009.
13. Department of Mathematics, University of the Basque Country. Leioa, Spain. 21 May 2009.
14. Department of Mathematics, University of Pittsburgh. Pittsburgh (PA), USA. 11 February 2010.

Contributed to workshops and conferences

1. Conference “Trends in Banach Spaces and Operator Theory”. The University of Memphis. Memphis, Tennessee, USA. 5–9 October 2001.
2. Conference “Differential equations and related topics”. Moscow Lomonosov State University. Moscow, Russia. 16–22 May 2004.
3. Conference “Nonlinear Elliptic and Parabolic Problems”. University of Zurich. Zurich, Switzerland. 28–30 June 2004.
4. “Trends and challenges in the Calculus of Variations and applications. A satellite conference of the ICM 2006”. University of Castilla-La Mancha. Toledo, Spain. 16–18 August 2006.
5. “First Winter School at IMDEA on PDEs and Inequalities”. IMDEA Matemáticas. Universidad Autónoma de Madrid. Madrid, Spain. 26–30 January 2009.

Organization of conferences

- Organizer of the mini-symposium *Mathematical modelling and analysis of the surface energy* in the meeting “Multimat: Multi-scale modelling and characterization for phase transformations in advanced materials”. Academy of Sciences of the Czech Republic. Prague, Czech Republic. 19–21 April 2007.
- Organizer of a session in the workshop “OxMOS / MULTIMAT Workshop on Microstructure”. University of Oxford. Oxford, UK. 2–5 September 2007.

Principal investigator of research projects

- *Calculus of variations applied to Materials Science*. Ministry of Science and Innovation (Spain). From 1 Jan 2010 to 31 Dec 2012.
- *Dynamics of free-discontinuity problems in Solid Mechanics*. Basque Government. From 1 Jan 2010 to 31 Dec 2012.

Teaching experience

- Teaching assistant of *Differential Equations* (Fourth year, Mathematics). Faculty of Mathematical Sciences. University Complutense Madrid. Second semester 2004.
- Class tutor of *Solid Mechanics* (Section C, Mathematics). Mathematical Institute. University of Oxford. Michaelmas term 2005, 2006 and 2007.
- Graduate lectures: *Bifurcation Theory*. Mathematical Institute. University of Oxford. Michaelmas term 2007.
- Class tutor of *Nonlinear Systems* (Section B, Mathematics). Mathematical Institute. University of Oxford. Hilary term 2008.
- Graduate lectures: *Calculus of Variations and applications to Solid Mechanics*. BCAM. January 2010.