

CURRICULUM VITAE (CVA)

Part A. PERSONAL INFORMATION

First name	DAVID		
Family name	MARTÍN DE DIEGO		
Gender (*)	Male	Birth date	15/05/1967
Social Security, Passport, ID number	50714722K		
e-mail	david.martin@icmat.es	URL Web: http://www.icmat.es/dmartin	
Open Researcher and Contributor ID (ORCID) (*)	K-7026-2014 0000-0001-6762-8909		

A.1. Current position

Position	Research Scientist at CSIC		
Initial date	2008		
Institution	ICMAT (CSIC-UAM-UCM-UC3M)		
Department/Center	<u>Mathematics</u>		
Country	Spain	Teleph. number	696890034
Key words	Geometric mechanics, Geometric Integration, Control theory, Optimization		

A.2. Previous positions (research activity interruptions, indicate total months)

Period	Position/Institution/Country/Interruption cause
2000-2008	Scientist , CSIC
1998-2000	Associated Professor, University of Valladolid
1992-1998	University Assistant, UNED

A.3. Education

PhD, Licensed, Graduate	University/Country	Year
MSc Mathematics	University Complutense of Madrid	1990
Ph.D. Best PhD Dissertation award	University Complutense of Madrid, Spain	1995

Google scholar: [David Martín De Diego](#)

Part B. CV SUMMARY (max. 5000 characters, including spaces)

I am Research Scientist at the Instituto de Ciencias Matemáticas-ICMAT, since 2008. My work focuses on the development and study of applications of geometric mechanics in a wide variety of topics, including geometric integration, optimization, machine learning



nonholonomic mechanics, Hamilton-Jacobi theory, optimal control theory, Lagrangian system reduction, robotics and multi-agent systems, interconnection of mechanical systems... My research emphasizes the important relationship between differential geometry (symplectic, Poisson, Dirac structures...) and dynamical systems. (continuous and discrete), such as mechanical systems and systems with symmetries and also in the area of optimal control theory. I have published about 120 research papers in the main journals of my research area, **Foundations of Computational Mathematics, Numerische Mathematik, Archive for Rational Mechanics and Analysis, Journal de Mathématiques Pures et Appliquées, Nonlinearity, SIAM Journal on Control and Optimization, Journal of Nonlinear Science, Discrete and Continuous Dynamical Systems - Series A, Journal of Physics A, Journal of Machine Learning Research** etc. Some of these articles are currently an international reference, such as the derivation, for the first time, of the Hamilton-Jacobi equation for nonholonomic systems, derivation of families of optimization methods in one-to-one correspondence that generalize Polyak's heavy ball and Nesterov's accelerated gradient, the construction of geometric integrators for nonholonomic systems and reduced systems using symplectic groupoids, the derivation of geometric integrators for the optimal control of mechanical systems admitting discontinuities in the control variables or the existence of metrics that minimize the length of the solutions of mechanical nonholonomic systems...

I am member of the **Editorial Board of the Journal of Nonlinear Science** and La Gaceta de la RSME of which I was Editor in Chief from 2003-2008. I was editor of Journal of Geometric Mechanics and I am also the author of two books on popularization of mathematics: *Princesas, Abejas y Matemáticas* and *Matemáticas y Matemáticas del Sistema Solar* (the latter in collaboration with M. de León and J.C. Marrero). As management positions include the work as Deputy Director of ICMAT (05/02/2016-04/04/2018), Director of the Mathematical Culture Unit of ICMAT since 2007 (scientific culture unit recognized by the FECYT), that of Vice President of the RSME that I have held from 2015 until February 2022 and representative in the Strategic Mathematics Network of ICMAT. I also highlight the General Coordination of one of the most important works for the Spanish Mathematical community: "[El Libro Blanco de las Matemáticas](#)" published by the Ramón Areces Foundation in 2019.

5 sexenios (1992-1997, 1998-2003, 2004-2009, 2010-2015, 2016, 2021)

6 quinquenios

Theses supervised in the last 10 years: 5

Total number of citations: 1780 citations Scopus, 1703 Web of Science, 3875 (Google Scholar)

Number h: 23 (Scopus, Web of Science), 36 (Google Scholar)

Part C. RELEVANT MERITS (*sorted by typology*)

C.1. Publications (*10 papers*)

[Mathscinet link](https://mathscinet.ams.org/mathscinet/MRAuthorID/354529) <https://mathscinet.ams.org/mathscinet/MRAuthorID/354529>

1. Cédric Martínez Campos, Alejandro Mahillo, David Martín De Diego: **Discrete Variational Calculus for Accelerated Optimization**, Journal of Machine Learning Research 24(25):1-33, 2023.
2. María Barbero Liñán, David Martín de Diego: **Retraction maps: a seed of geometric integrators**, Foundations of Computational Mathematics 2022.
3. **Alexandre Anahory Simoes, Juan Carlos Marrero, David Martín de Diego: Exact discrete Lagrangian mechanics for nonholonomic mechanics**, Numerische Mathematik 2022.
4. Anahory Simoes, Alexandre; Marrero, Juan Carlos; Martín de Diego, David **Radial kinetic nonholonomic trajectories are Riemannian geodesics!** Anal. Math. Phys. 11 (2021), no. 4, Paper No. 152, 28 pp.
5. Colombo, Leonardo J.; Martín de Diego, David; Nayak, Aradhana; Sato Martín de Almagro, Rodrigo T. **Geometric optimal trajectory tracking of nonholonomic mechanical systems**. SIAM J. Control Optim. 58 (2020), no. 3, 1652-1675.

6. Barbero Liñán, M.; Cortés, J.; Martín de Diego, D.; Martínez, S.; Muñoz Lecanda, M. C. **Global controllability tests for geometric hybrid control systems**. Nonlinear Anal. Hybrid Syst. 38 (2020), 100935, 17 pp.
7. Elena Celledoni, Elena; Farré Puiggali, Marta; Hoel Hoiseth Eirik; Martín de Diego, David: **Energy-Preserving integrators applied to nonholonomic systems**. J. Nonlinear Sci 2019.
8. Martín de Diego, D.; de Almagro, R. Sato Martín **Variational order for forced Lagrangian systems**. Nonlinearity 31 (2018), no. 8, 3814–3846.
9. Ferraro, Sebastián; de León, Manuel; Marrero, Juan Carlos; Martín de Diego, David; Vaquero, Miguel **On the geometry of the Hamilton-Jacobi equation and generating functions**. Arch. Ration. Mech. Anal. 226 (2017), no. 1, 243–302.
10. de León, Manuel; Martín de Diego, David; Vaquero, Miguel **Hamilton-Jacobi theory, symmetries and coisotropic reduction**. J. Math. Pures Appl. (9) 107 (2017), no. 5, 591–614.

C.3. Research projects, indicating your personal contribution. In the case of young researchers, indicate lines of research for which they have been responsible.

1. **GEOMETRY OF DYNAMICAL SYSTEMS: FROM THEORY TO APPLICATIONS**
Reference PID2022-137909NB-C21. Instituto de Ciencias Matemáticas. Principal investigators: **David Martín de Diego**. Budget: 178.750 €
2. **GEOMETRIC STRUCTURES IN DYNAMICAL SYSTEMS, MECHANICS AND HYDRODYNAMICS** ,Reference: PID2019-106715GB-C21 Instituto de Ciencias Matemáticas. Principal investigators: **David Martín de Diego** and Daniel Peralta Salas 2020-2023 Budget 76.287 euros
3. **Optimización de rutas marítimas con información oceanográfica y meteorológica en tiempo real.**
Proyectos de Transición Ecológica y Digital 2021
TED2021-129455B-I00.
4. **THE INTERPLAY BETWEEN GEOMETRY, MECHANICS AND CONTROL IN MULTI-AGENT SYSTEMS**
LINKA20079 Program i-Link+2018.
Participants; KTH, Universidad de Groningen, Universidad de California/San Diego
Principal investigator: **David Martín de Diego**, 2019-2020. Budget: 24.000 euros
5. **NEW APPLICATIONS OF GEOMETRIC INTEGRATION IN ENGINEERING**
EIN2019-103037. Instituto de Ciencias Matemáticas
Principal Investigator: **David Martín de Diego**. Duration: 2019-2021. Budget: 15,500 €.
6. **ANÁLISIS GEOMÉTRICO Y NUMÉRICO DE SISTEMAS DINÁMICOS Y APLICACIONES A LA FÍSICA MATEMÁTICA,**
Reference: MTM2016-76072-P, Instituto de Ciencias Matemáticas. Principal investigators: **David Martín de Diego** and Daniel Peralta Salas 2017-2020 Budget: 53.900 euros
7. **ESTRUCTURAS GLOBALES Y MÉTODOS NUMÉRICOS, SISTEMAS DINÁMICOS Y CONTROL CON APLICACIONES EN MECÁNICA**
Reference: MTM2010-21186-C02-01 Instituto de Ciencias Matemáticas
Principal Investigator: **David Martín de Diego**, 2011-2013 Budget: 122.600 euros
8. Programme: **FP7-PEOPLE-2009-IRSES**, Marie Curie International Fellowships Proposal n° 246981 –Acronym: GEOMECH. Name: Geometric Mechanics.
Principal investigator (Spain): **David Martín de Diego**, 2012-2014 Budget : 158.400 euros
9. **GEOMETRIC METHODS FOR OPTIMALLY CONTROL AUTONOMOUS VEHICLES**
PMII-C4-0278 imath CONSOLIDER Principal investigator: **David Martín de Diego** 2010
Budget 50.000 €
10. PROGRAMA DE EXCELENCIA SEVERO OCHOA SEV-2015-0554 Principal Investigator :
Diego Córdoba. Budget 4.000.000 €. 2020 – 2023.
PROGRAMA DE EXCELENCIA SEVERO OCHOA SEV-2015-0554, Principal Investigator:
Diego Córdoba. Budget 4.000.000 €. 2016 – 2019.
PROGRAMA DE EXCELENCIA SEVERO OCHOA SEV-2011, Principal Investigator
Principal: Manuel de León, Budget 4.000.000 €. 2012 – 2015.



Theses supervised in the last 10 years:

1. **Alexandre Anahory Simoes.** Ph.D in Mathematics at Department of Mathematics, Science Faculty, Universidad Autónoma de Madrid. Title: Geometric and Numerical analysis of nonholonomic systems. Advisors: Juan Carlos Marrero and David Martín de Diego. Date of defense: November 26, 2021. Postdoctoral fellow associated with FBBVA Project (December 2021- August 2022). Assistant Professor IE University (from September 2022).

2. **Rodrigo Takuro Sato Martín de Almagro.** Ph.D in Mathematics at Department of Mathematics, Science Faculty, Universidad Complutense de Madrid. Title: Discrete Mechanics for Forced and Constrained Systems. Advisor: David Martín de Diego. Date of defense: June, 2019. Postdoctoral fellow at Department of Mechanical Engineering, Institute of Applied Dynamics, Friedrich-Alexander-Universität Erlangen-Nürnberg (Aug 2019 - present).

3. **Marta Farré Puiggali.** Ph.D in Mathematics at Department of Mathematics, Science Faculty, Universidad Complutense de Madrid. Title: New developments and applications of the Inverse Problem of the Calculus of Variations. Advisors: David Martín de Diego and María Barbero Liñán. Date of defense: 2017. Post-doctoral fellow at University of Michigan, USA from 2017-2020. Senior Postdoc at University of Antwerp from 2020-2023.

4. **Leonardo Colombo.** PhD in Mathematics at Department of Mathematics, Science Faculty, Universidad Autónoma de Madrid. Title: Geometric and Numerical Methods for Optimal Control of Mechanical Systems. Advisor: David Martín de Diego. July 2014. Prize Vicent Caselles of RSME and FBBVA in 2016. He has held postdoctoral positions at Universidad de Michigan (USA), KTH Royal Institute of Technology (Sweden) and Juan de la Cierva Incorporación (ranked 1st in Mathematics). Postdoctoral Junior Leader Fellowship from la Caixa Foundation. Becario Leonardo FBBVA 2020. Since 2021 he is Científico Titular (Tenured Researcher) at CSIC.

Supervised postdoctoral stays:

Sebastián Ferraro (Universidad Nacional del Sur,, 2007) - 1 year

Paula Balseiro (University of La Plata, 2008) - 1 year

María Barbero (UPC, 2008) -1 month

Silvia Vilariño (University of Santiago de Compostela, 2008) - 2 months

Viviana Díaz (Universidad Nacional del Sur, 2009-2011) - 11 months

Ari Stern (Caltech, 2009)- 3 months

Viviana Díaz (UNS,)-5 months

María Barbero-Liñan (Universidad Politécnica de Cataluña, Spain, 2010 in the framework of Juan de la Cierva training program),

Viviana Díaz (National University of the South, Argentina, 2015)

Geir Bogfjellmo (NTNU, Norway, 2018-2019)

Leonardo Colombo (KTH, 2018, Juan de la Cierva training program),

Sebastian Ferraro (Universidad Nacional del Sur,, December 2022)

Viviana Diaz (Universidad Nacional del Sur, January 2023)

Supervision of several students within the JAE programme and three master students