

Part A. PERSONAL INFORMATION

CV date 1-10-2023

First and Family name	Francisco Castro Jiménez		
Social Security, Passport, ID number		Age	
Researcher codes	Open Researcher and Contributor ID (ORCID**)	0000-0002-7513-3786	
	SCOPUS Author ID (*)	6603150691	
	WoS Researcher ID (*)	K-1703-2014	

(*) *Optional*

(**) *Mandatory*

A.1. Current position

Name of University/Institution	University of Seville		
Department	Algebra/Faculty of Mathematics/Institut of Mathematics, IMUS		
Address and Country	Campus Reina Mercedes, E-41012 Sevilla (Spain)		
Phone number	E-mail		
Current position	Full Professor/Catedrático	From	31-01-1997
Key words	D-module theory, computational algebra, singularities, algebraic geometry, commutative algebra, integer optimization		

A.2. Education

PhD, Licensed, Graduate	University	Year
Licenciatura en Matemáticas	University of Seville	1979
Docteur de 3eme cycle	Université Paris VII (Denis Diderot)	1984
Doctor en Matemáticas	University of Seville	1984

A.3. General indicators of quality of scientific production (see instructions)

<i>Indicator</i>	<i>Medida</i>
Num. Sexenios reconocidos	6
Last "sexenio"	2014/2019
H-index (WoS)	10
Número de citas totales (GoogleScholar; WoS)	(779, 255)
Promedio de citas por artículo total (GoogleScholar; WoS)	(13,52; 5,7)
Publications in Q1, from 2010	8
Advised PhD, last 10 years	-
Total publicaciones (MathSciNet; WoS)	(53; 52)

Part B. CV SUMMARY (max. 3500 characters, including spaces)

My scientific production sits in the fields of algebraic geometry and commutative algebra, in the theory of singularities of algebraic and/or analytical varieties and in the theory of D-modules (algebraic study of systems of linear differential equations in several complex variables) with special interest in computational methods, allowing the explicit description of various types of algebraic and geometric invariants. Some of my articles are in (MSC classification, primary): 32C38, Sheaves of differential operators and their modules, D-modules. 16Z05, Computational aspects of associative rings. 16S32, Rings of differential operators. 13P10, Groebner bases; other bases for ideals and modules (e.g., Janet and border bases). 32S20, Global theory of singularities; cohomological properties. 32S40, Monodromy; relations with differential equations and D-modules. 32S25, Surface and hypersurface singularities. 68W30, Symbolic computation and algebraic computation (the list is not exhaustive).

I have proved division theorems (Weierstrass-Hironaka type) for rings of linear differential operators (with polynomial, convergent or formal power series coefficients). These division



theorems are the basis of some algorithms for computing Groebner bases for ideals of differential operators (Buchberger algorithm for the linear differential case). These algorithms - and others based on them - are implemented in various computer algebra systems: Singular, Macaulay, CoCoA, Risa/Asir. In addition, I have also collaboratively applied effective methods in the study of logarithmic vector fields, with respect to a complex hypersurface, and to the problem of the comparison between logarithmic and meromorphic cohomologies. These effective methods having been successfully applied, in collaboration with other researchers, to Lie algebra classification problems and to some integer optimization problems. I have developed joint research projects with researchers from various universities (Seville, Granada, Angers, Kobe, Georgia Institute of Technology, Zaragoza, Complutense de Madrid, Vienna, Aachen, Siegen, Tokyo, Marseille, Warwick). These projects have given rise to several scientific publications, some of which are included in the CVA list (C.1.). I have been IP of BFM, MTM projects and of the Andalusian Government since 2001, and I have participated in "Acciones Integradas" with France, United Kingdom, Austria and Germany. I have been a referee for, among others, the following journals: *Advances in Math.*, *Compositio Math.*, *Duke Math. J.*, *Experimental Math.*, *Found. Computational Math.*, *J. Algebra*, *J. Symbolic Computation*. I have been a member of the panel of evaluating experts: H2020 - ITN 2016 Evaluation: MAT-PHY Panel. January-February 2017 and H2020-MSCA-ITN-2018 Evaluation: MAT-PHY Panel. February-April 2018 and November 2018. H2020-MSCA-IF-2019: October-December 2019. Evaluator for the Austrian Science Fund FWF (2016). Member of the Mathematics panel of the Fundação para a Ciência e a Tecnologia, I. P. (FCT) -2017. Jul-1-2018 to Mar-25-2021: member the Math. Panel of the MTM area of "Agencia Estatal de Investigación" in Spain.

Part C. RELEVANT MERITS (sorted by typology)

C.1. Publications (see instructions)

- [1] Castro-Jiménez, F. J.; Mond, D.; Narváez-Macarro, L. Logarithmic comparison theorems. *Handbook of geometry and topology of singularities IV*, 559-599. Springer, Cham, [2023], ISBN:978-3-031-31924-2, https://doi.org/10.1007/978-3-031-31925-9_12
- [2] Castro-Jiménez, F. J.; Cobo Pablos, H. On certain polynomial systems involving Stirling numbers of second kind. *J. Symbolic Comput.* 109 (2022), 325-350.
- [3] F.J. Castro-Jiménez, M.C. Fernández-Fernández, M. Granger. Gevrey Expansions of Hypergeometric Integrals II. *International Mathematics Research Notices* (1073-7928 / 1687-0247). 2021, no. 23, 17823-17861. <https://doi.org/10.1093/imrn/rnz303>. WOS(JCR) Mathematics, Q1.
- [4] F.J. Castro-Jiménez; M. Ceballos; J. Núñez-Valdés. Filiform Lie algebras with low derived length. *Mediterranean Journal of Mathematics*, 2020, 17(6), 198. <https://doi.org/10.1007/s00009-020-01642-z> WOS(JCR) Mathematics, Q1.
- [5] Castro-Jiménez, F.J., Popescu, D. and Rond, G. Linear nested Artin approximation theorem for algebraic power series. *Manuscripta Math.* 158 (1-2), 55-73 (2019). <https://doi.org/10.1007/s00229-018-1025-0> WOS(JCR) Mathematics, Q3.
- [6] Alonso, M.E, Castro-Jiménez, F.J., Hauser, H., Koutschan, Ch.: Echelons of power series and Gabrielov's counterexample to nested linear Artin approximation. *Bull. London Math. Soc.* 50 (2018) 649-662. <https://doi.org/10.1112/blms.12162> WOS(JCR) Mathematics, Q2.
- [7] Alonso, M.E., Castro-Jiménez, F.J., Hauser, H.: Encoding algebraic power series. *Found. Comput. Math.* 18 (2018), no. 3, 789-833. <https://doi.org/10.1007/s10208-017-9354-z> WOS(JCR) Mathematics, Q1-D1.

C.2. Research projects



[1] Title: Métodos computacionales en Álgebra, D-módulos y teoría de la representación. PID2020-117843GB-I00. Entidad financiadora: Ministerio de Economía y Competitividad. Entidades participantes: Universidades de Sevilla, Angers (Francia), Kobe (Japón), Viena (Austria) y Warwick (R.U.). Duración: 2021-2025. Cuantía: EUR. IPs: Francisco J. Castro Jiménez, Mercedes Rosas Celis.

[2] Title: Métodos Computacionales en Álgebra, D-Módulos, Teoría de la Representación y Optimización. MTM2016-75024-P. Entidad financiadora: Ministerio de Economía y Competitividad. Entidades participantes: Universidades de Sevilla, Loyola Andalucía, Angers (Francia), Kobe (Japón), Viena (Austria) y Warwick (R.U.). Duración: 2017-2020. Cuantía: 90.100 EUR. IPs: Francisco J. Castro Jiménez, Mercedes Rosas Celis.

[3] Title: Álgebra, singularidades, teoría de números y aplicaciones. US-1262169. Entidad financiadora: Junta de Andalucía (Consejería de Economía y Conocimiento). Entidades participantes: Universidades de Sevilla, Loyola Andalucía, Angers (Francia), Kobe (Japón), Viena (Austria), Aachen and Siegen (Alemania) and Warwick (R.U.). Duración: 2020-2022. Cuantía: 80.000 EUR. IPs: Sara Arias de Reyna Domínguez, Francisco J. Castro Jiménez.

[4] RedEaca, Red Temática de Álgebra Computacional, Cálculo Simbólico y Aplicaciones. Duración: 01-07-2017/31-10-2019. MTM2016-81932-REDT. Entidad financiadora: Ministerio de Economía y Competitividad. Entidades participantes: Universidades de Alcalá de Henares, Barcelona, Cantabria, Granada, La Laguna, La Rioja, Santiago de Compostela, Sevilla. 11.000 EUR. I.P.: Francisco J. Castro Jiménez.

[5] RedEaca, Red Temática de Álgebra Computacional, Cálculo Simbólico y Aplicaciones. Duración: 2015-16 (2 años). MTM2014-56142-REDT. Entidad financiadora: Ministerio de Economía y Competitividad. Entidades participantes: Universidades de Alcalá de Henares, Barcelona, Cantabria, Granada, La Laguna, La Rioja, Santiago de Compostela, Sevilla. 10.000 EUR. I.P.: Francisco J. Castro Jiménez.

[6] Title: Métodos Computacionales y Efectivos en Álgebra, D-Módulos y Optimización (MTM2013-40455-P). Entidad financiadora: Ministerio de Economía y Competitividad. Entidades participantes: Universidades de Sevilla, Angers (Francia), Kobe (Japón), Viena (Austria) y Warwick (R.U.). Duración: 2014-2015-2016. Cuantía: 90.100 EUR I.P.: Francisco J. Castro Jiménez y Mercedes Rosas Celis.

[7] Project: Ayudas a Consolidación de Grupos de la Junta de Andalucía Referencia: FQM-333. Entidades participantes: Universidades de Sevilla y Zaragoza. Entidad Financiadora: Junta de Andalucía. 18.244,54 EUR. Fecha de Inicio: 01-01-2010. Fecha de Finalización: 31-12-2015. I.P.: Francisco J. Castro Jiménez

[8] Title: Singularidades, Geometría Algebraica Aritmética y Teoría de Representaciones: Estructuras y Métodos Diferenciales, Cohomológicos, Combinatorios y Computacionales (P12-FQM-2696) Entidad financiadora: Junta de Andalucía. 116.494 EUR. Entidades participantes: Universidad de Sevilla. Inicio: 30-01-2014. Finalización: 29-01-2018. Tipo: Investigador. IP: Luis Narváez Macarro (US).

[9] Title: Nuevos desafíos de la matemática combinatoria: enfoques no estándares en optimización discreta y álgebra computacional. Aplicaciones. (FQM5849) Financia: Junta de Andalucía. Entidades participantes: U. de Sevilla y Cádiz. Duración: 2011- 2015. Tipo de participación: Investigador. IP: Justo Puerto (US). 254.752 EUR.

C.3. Contracts, technological or transfer merits

A Panorama of Singularities. Editors: F.J. Castro-Jiménez; D.B. Massey; B. Teissier; M. Tosun. Contemporary Mathematics, Volume: 742; 2020; 217 pp; AMS-RSME; AMS. <https://www.ams.org/books/conm/742/>

C.5. (Advised PhD, desde 2010).

Title: Soluciones Gevrey de Sistemas Hipergeométricos. Doctorando: Fernández Fernández, María Cruz. Universidad: Sevilla Fecha: 2010 (Premio Extraordinario de Doctorado).

C.6. Congresses (Scientific, Organizing Committees; last 5 years)



[6] V Escuela Internacional de Álgebra Computacional y Aplicaciones. Task: Member of the Scientific Committee. Date/Place: Bcam, Bilbao. 25-28 February 2020.

<http://www.bcamath.org/es/workshops/5-eaca-school>

[5] IV Escuela Internacional de Álgebra Computacional y Aplicaciones.

Task: Member of the Scientific Committee. Date/Place: Santiago de Compostela, 20 - 23 March, 2018. <https://www.usc.es/regaca/eacaschool18/index.html>

[4] XVI Encuentro de Álgebra Computacional y Aplicaciones (EACA 2018).

Task: Member of the Scientific Committee. Date/Place: Zaragoza, 4-6 July, 2018.

<http://eventos.unizar.es/15634/detail/xvi-eaca-encuentro-de-algebra-computacional-y-aplicaciones.html>

[3] A panorama on singular varieties: a conference to celebrate Le Dung Trang 70th birthday.

Task: Member of the Scientific and the Organizing Committees. Date: 7 - 10 February, 2017. Place: IMUS, Sevilla. <http://www.imus.us.es/ledt70/>

[2] IMUS-MSRI Mixed Integer Nonlinear Programming: Theory, algorithms and applications

Task: Co-organizer (with Justo Puerto (US) and Elena Fernández (UPC)). Date: 20 June, 1 July, 2016. Place: IMUS, Sevilla. <http://www.imus.us.es/IMUS-MSRI2016/en/>

[1] III Escuela Internacional EACA, Álgebra computacional y aplicaciones. Task: Co-

organizer and Chair of the Scientific Committee. Date: 18-21 February, 2016. Place. IMUS and Facultad de Matemáticas, Sevilla. <https://www.imus.us.es/EACASCHOOL16/>

C.7. Evaluation Tasks.

Member of the expert panel: 1) H2020-ITN 2016 Evaluation: MAT-PHY Panel. January-February 2017. 2) H2020-MSCA-ITN-2018 Evaluation: MAT-PHY Panel. February-April 2018 and November 2018. 3) H2020-MSCA-IF-2019: October-December 2019. 4) Austrian Science Fund FWF (2016). 5) Mathematics Panel, Fundação para a Ciência e a Tecnologia, I. P. (FCT)-2017. 6) Member of the Mathematics Panel MTM, División de Coordinación, Evaluación y Seguimiento Científico Técnico de la Agencia Estatal de Investigación AEI (Spain) 1-07-2018/25-03-2021.