

Antonio Jiménez Pastor

Contact information

Affiliation	ETSAM, Technical School for Architecture, Universidad Politécnica de Madrid
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Employment

2024–now **Assistant Professor**, *Universidad Politécnica de Madrid, Madrid, Spain*,
ETSAM, Technical School for Architecture.

2022–2024 **Postdoc**, *Aalborg University, Aalborg, Denmark*,
DEIS, Technical Faculty of IT and Design (2 year).
Advisor: Max Tschaikowski

2021–2022 **Postdoc**, *École Polytechnique, Paris, France*,
Laboratoire d'Informatique (1 year).
Advisor: Gleb Pogudin

2021 **Postdoc**, *Johannes Kepler University (JKU), Linz, Austria*,
Research Institute for Symbolic Computation (8 months).
Advisor: Veronika Pillwein

Publications

Peer-reviewed articles

1. A. Leguizamon-Robayo, A. Jiménez-Pastor, M. Tribastone, M. Tschaikowski, A. Vandin, *Approximate constrained lumping of chemical reaction networks*, Proceedings of the Royal Society A 481 (2317), 2025.
2. A. Jiménez-Pastor, S.L. Rueda, M.A. Zurro, R. Hernández, R. Delgado, *Computing Almost Commuting Bases of ODOs and Gelfand-Dickey Hierarchies*, Mathematics in Computer Science 19 (1), 4, 2025.
3. L. Burgholzer, A. Jiménez-Pastor, K.G. Larsen, M. Tribastone, M. Tschaikowski, R. Wille, *Forward and Backward Constrained Bisimulations for Quantum Circuits using Decision Diagrams*, ACM Transactions on Quantum Computing 6 (2), 1-21, 2025.

4. A. Jiménez-Pastor, A.K. Uncu, *Factorial basis method for q-series applications*, Proceedings of the 2024 International Symposium on Symbolic and Algebraic Computation, 2024.
5. A. Jiménez-Pastor, D. Toller, M. Tribastone, M. Tschaikowski, *Prope lumping for positive bilinear control systems*, IEEE Transactions on Automatic Control 69 (11), 8120-8127, 2024.
6. A. Jiménez-Pastor, K.G. Larsen, M. Tribastone, M. Tschaikowski, *Efficient Simulation of Quantum Circuits by Model Order Reduction*, Proceedings of the 30th International Conference on Tools and Algorithms for the Construction and Analysis of Systems (TACAS), 2024.
`https://arxiv.org/abs/2308.09510`
7. A. Leguizamon-Robayo, A. Jiménez-Pastor, M. Tribastone, M. Tschaikowski, A. Vandin, *Approximate Constrained Lumping of Polynomial Differential Equations*, in Computational Methods in Systems Biology (CMSB), Lecture Notes in Computer Science 14137, 106–123, 2023.
8. A. Jiménez-Pastor, S.L. Rueda, M.A. Zurro, *Computing almost-commuting basis of Ordinary Differential Operators*, ACM Communications in Computer Algebra 57 (3), 111–118, 2023.
9. A. Jiménez-Pastor, M. Petkovšek, *The factorial-basis method for finding definite-sum solutions of linear recurrences with polynomial coefficients*, Journal of Symbolic Computation 117, 15–50, 2023.
10. A. Jiménez-Pastor, J. Jacob, G. Pogudin, *Exact linear reduction for rational dynamical systems*, in Computational Methods in Systems Biology (CMSB), Lecture Notes in Computer Science 13447, 198–216, 2022.
11. A. Jiménez-Pastor, G. Pogudin, *Computing exact nonlinear reductions of dynamical models*, ACM Communications in Computer Algebra 56 (2), 25–31, 2022.
12. A. Jiménez-Pastor, *Simple differentially definable functions*, Proceedings of the 2021 ACM International Symposium on Symbolic and Algebraic Computation (ISSAC), 209–216, 2021.
13. A. Jiménez-Pastor, P. Nuspl, V. Pillwein, *On C^2-finite sequences*, Proceedings of the 2021 ACM International Symposium on Symbolic and Algebraic Computation (ISSAC), 217–224, 2021.
14. A. Bostan, A. Jiménez-Pastor, *On the exponential generating function of labelled trees*, Comptes Rendus, Mathématique 358 (9–10), 1005–1009, 2020.
15. A. Bostan, F. Chyzak, A. Jiménez-Pastor, P. Lairez, *The Sage package `comb_walks` for walks in the quarter plane*, ACM Communications in Computer Algebra 54 (2), 30–38, 2020.
16. A. Jiménez-Pastor, V. Pillwein, M. F. Singer, *Some structural results on D^n-finite functions*, Advances in Applied Mathematics 117, 2020.
17. A. Jiménez-Pastor, *A Sage implementation for DD-finite functions*, ACM Communications in Computer Algebra 53 (2), 53–56, 2019.
18. A. Jiménez-Pastor, V. Pillwein, *A computable extension for D-finite functions: DD-finite functions*, Journal of Symbolic Computation 94, 90–104, 2019.

19. A. Jiménez-Pastor, V. Pillwein, *Algorithmic arithmetics with DD-finite functions*, Proceedings of the 2018 ACM International Symposium on Symbolic and Algebraic Computation (ISSAC), 231–237, 2018.

Preprints

1. A. Jiménez-Pastor, S.L. Rueda, *Effective computation of centralizers of ODOs*, arXiv, 2025.
   `https://arxiv.org/abs/2505.01289`
2. M. Barkatou, A. Jiménez-Pastor, *Linearizing differential equations: Riccati solutions as D^n-finite functions*, DK Preprint series, 2019.
   `https://www.dk-compmath.jku.at/publications/dk-reports/2019-06-30`

Recent Presentations in Congress

1. *Computing centralizers for linear differential operators*, Applications of Computer Algebra (ACA'25), Heraklion, 14–18 July, 2025.
2. *Factorial Basis Method for q-Series Applications*, International Symposium on Symbolic and Algebraic Computation (ISSAC' 24), Raleigh, 16–19 July, 2024.
3. *Computing Almost-commuting Basis of Ordinary Differential Operators*, International Symposium on Symbolic and Algebraic Computation (ISSAC'23), Tromsø, 24–27 July, 2023.
4. *Difference-differential polynomials in SageMath*, Applications of Computer Algebra (ACA'23), Warsaw, 17–21 July, 2023.
5. *Exact linear reduction for rational dynamical systems*, 20th International Conference on Computational Methods in Systems Biology (CMSB'22), Bucharest, 14–16 September, 2022.
6. *DD-finite functions. Working automatically on SageMath*, Applications of Computer Algebra (ACA'23), Istanbul-Gebze, 15–19 August, 2022.
   (software presentation)
7. *The Factorial-Basis method for finding Definite-sum solutions of linear recurrences*, Applications of Computer Algebra (ACA'22), Istanbul-Gebze, 15–19 August, 2022.
8. *Computing exact nonlinear reductions of dynamical models*, International Symposium on Symbolic and Algebraic Computation (ISSAC'22), Lille, 4–7 July, 2022.
   (poster presentation)
9. *C^2-finite sequences*, Polsys-Specfun Seminar, Sorbonne Université and INRIA Saclay, 15 October, 2021.
10. *Simple differentially definable functions*, International Symposium on Symbolic and Algebraic Computation (ISSAC'21), online conference, 19–23 July, 2021.
11. *DD-finite functions: working beyond holonomic*, Mathematical Congress of the Americas (MCA 2021), online conference, 12–16 July, 2021.
12. *The Sage package `comb_walks` for walks in the quarter plane*, International Symposium on Symbolic and Algebraic Computation (ISSAC'20), online conference, 20–22 July, 2020.

13. *Differentially definable functions: structure and algorithms* (poster), International workshop on Differential Algebra and Related Topics (DART X), New York, 10–14 February, 2020.
14. *DD-finite functions implemented in Sage*, Mathematical Aspects of Computer and Information Sciences (MACIS), Gebze-Istanbul, 13–15 November, 2019.
15. *D^n-finite functions: more special functions on the holonomic world*, Computational Mathematics and Approximation Theory workshop (CMAPT), Strobl, 24–28 August, 2019.
16. *Linearizing differential equations: Riccati solutions as D^n-finite functions*, International Conference "Computer Algebra" (ICCA), Moscow, 13–21 June, 2019.
17. *D^n-finite functions: a growing chain*, Functional Equations in Limoges (FELIM), Limoges, 25–27 March, 2019.
18. *Extending the holonomic universe: DD-finite functions and automated identities proofs*, Bringing Young Mathematicians Together (BYMAT), Madrid, 7–9 May, 2018.

Software

2023 **dalgebra**, *Python (SageMath)*
Software developed for Python (emphSageMath) to compute manipulate algebraic structures together with differential and difference operators. Allow the construction of arbitrary difference-differential ring, compute with difference-differential polynomials and includes a small sample of differential elimination techniques. In collaboration with S.L. Rueda (Universidad Politécnica de Madrid) and M.A. Zurro (Universidad Autónoma de Madrid).
`https://github.com/antonio-jp/dalgebra`

2022 **pseries_basis**, *Python (SageMath)*
Software developed for Python (emphSageMath) to compute definite-sum solutions to recurrence and differential equations when expanding the solutions over some bases of the ring of sequences or the ring of formal power series. In collaboration with M. Petkovšek (University of Ljubljana, Ljubljana), and A.K. Uncu (Bath University).
`https://github.com/antonio-jp/pseries_basis`

2022 **CLUE**, *Python (Sympy) and C++*
Software developed for Python to compute exact reductions of dynamical systems. More precisely, the software developed allows to compute minimal constrained lumpings for a given dynamical rational system. In collaboration with G. Pogudin (École Polytechnique, Paris), M. Tschaikowski (Aalborg University), and A. Leguizamon-Robayo (Aalborg University).
`https://github.com/clue-developers/CLUE`

2020 **comb_walks**, *Python (SageMath)*
Package developed for Python (*SageMath*) for studying and obtaining information for the generating functions that counts walks in the quarter plane. In collaboration with A. Bostan, F. Chyzak and P. Lairez (INRIA, Saclay).
`https://gitlab.inria.fr/discretewalks/comb_walks`

2020 **dd_functions**, *Python (SageMath)*
Package developed for Python (*SageMath*) for manipulating symbolically *differentially definable* functions, i.e., functions that satisfy linear differential equations. Developed as part of the Ph.D. thesis.
`https://github.com/antonio-jp/dd_functions`

Education

2016–2020 **Ph.D. in Mathematics**, *Johannes Kepler University*, Linz, Austria
Advisor: Veronika Pillwein.
Thesis: **A computable extension for holonomic functions: DD-finite functions**

2014–2015 **Master Degree in Mathematics and Applications**,
Universidad Autónoma de Madrid, Madrid, Spain, ***GPA*** *– 9.25/10 (2.87/4)*
Advisors: Jesús García Azorero and Maria-Angeles Zurro Moro.
Thesis: **Partial Differential Equations on Graphs: Eigenvalues problems and Applications**

2009–2014 **Double Degree in Mathematics and Computer Science**,
Universidad Autónoma de Madrid, Madrid, Spain, ***GPA*** *– 9.25/10 (3.04/4)*
Advisor: Maria-Angeles Zurro Moro.
Thesis: **Symbolic integration of rational functions on differential fields**

Participation in Research Projects

2022–now **Algorithmic Differential Algebra and Integrability**, *(ADAI)*, Spanish goverment (Ministerio de Ciencia e Innovación), grant PID2021-124473NB-I00.
PI: Sonia L. Rueda Pérez and Maria-Ángeles Zurro Moro.
Duration: 3 years. Start date: 1 September 2022

2021–2022 **Exact ODE Reduction**, *(XOR)*, Île-de-France goverment (Réseau Francilien en Sciences Informatiques).
PI: Gleb Pogudin.
Duration: 2 years. Start date: January 2021

2021–2021 **Computer Algebra and Combinatorial Inequalities**, *(F50-07)*, Austrian Science Fund (FWF), grant SFB-F50.
PI: Veronika Pillwein.
Duration: 8 years. Start date: 1 March 2013

Research related activities

Reviewer for
Journal of Difference Equations and Applications (JDEA)
International Symposium on Symbolic and Algebraic Computation (ISSAC)
Journal of Symbolic Computation (JSC)
Proceedings of Transient Transcendence in Transylvania (Trans)
Mathematical Aspects of Computer and Information Sciences (MACIS)
Computer Algebra in Scientific Computation (CASC).

Teaching experience

- **Universidad Politécnica de Madrid**:
  - *Affine and Projective Geometry* (Architecture Degree, 1st semester)
  - *Calculus* (Architecture Degree, 2st semester)
- **Aalborg University**:
  - *PBL Project Supervision* (Computer Science 5th semester)
  - *PBL Project Supervision* (Computer Science 4th semester)
- **École Polytechnique**:
  - *Computer Programming* (CSE102, lab sessions).

Honors and Awards

2022 **Best poster presentation**, *in ISSAC'22, Lille*, together with G. Pogudin.
Computing exact nonlinear reductions of dynamical models