

# JAVIER PÉREZ ÁLVARO

## Curriculum Vitae

Department of Mathematical Sciences  
University of Montana

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### EDUCATION

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#### Universidad Carlos III de Madrid, Spain

Ph.D, Mathematical Engineering (summa cum laude)

June 2015

MA, Mathematical Engineering

September 2011

#### Universidad Autónoma de Madrid, Spain

BA, Physics

June 2009

### PROFESSIONAL APPOINTMENTS

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#### Department of Mathematical Sciences, University of Montana, USA

Adjunct Assistant Professor.

August 2017

#### Department of Computer Science, KU Leuven, Belgium

Research Associate.

October 2016

#### School of Mathematics, The University of Manchester, UK

Research Associate.

September 2014

#### Department of Mathematics, Universidad Carlos III de Madrid, Spain

PIF Scholarship for research.

September 2010

### PUBLICATIONS

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#### Refereed Journal Articles

1. Condition numbers for inversion of Fiedler companion matrices, with Fernando De Terán, and Froilán M. Dopico. *Linear Algebra and its Applications*, 439, pp. 944–981, 2013.
2. New bounds for roots of polynomials based on Fiedler companion matrices, with Fernando De Terán, and Froilán M. Dopico. *Linear Algebra and its Applications*, 451, pp. 197–230, 2014.
3. Backward stability of polynomial root-finding using Fiedler companion matrices, with Fernando De Terán, and Froilán M. Dopico. *IMA Journal of Numerical Analysis*, 36, pp. 133–173, 2015.
4. Chebyshev rootfinding via computing eigenvalues of colleague matrices: when is it stable?, with Vanni Noferini. *Mathematics of Computations*, 86(306), pp. 1741–1767, 2016.
5. Fiedler–comrade and Fiedler–Chebyshev pencils, with Vanni Noferini. *SIAM Journal on Matrix Analysis and Applications*, 37(4), pp. 1600–1624, 2016. Also available as MIMS EPrint 2015.90, School of Mathematics, The University of Manchester, UK, 2016.

6. Pseudospectra and eigenvalue condition numbers of Fiedler matrices, with Fernando De Terán and Froilán M. Dopico. *Calcolo*, 54(1), pp. 319–365, 2017. Also available at [http://gauss.uc3m.es/web/personal\\_web/fdopico/papers/calcolo2015.pdf](http://gauss.uc3m.es/web/personal_web/fdopico/papers/calcolo2015.pdf).
7. Constructing strong linearizations for matrix polynomials in the Chebyshev bases, with Piers W. Lawrence. *SIAM Journal on Matrix Analysis and Applications*, 38(3), pp. 683–709, 2017. Also available as MIMS EPrint 2016.12.
8. Block Kronecker Linearizations of Matrix Polynomials and their Backward Errors, with Piers W. Lawrence, Froilán M. Dopico, and Paul Van Dooren. To appear in *Numerische Mathematik*. Available as MIMS EPrint 2016.34.
9. *Structured backward error analysis of linearized structured polynomial eigenvalue problems*, with Froilán Dopico and Paul Van Dooren. To appear in *Mathematics of Computation*, 2017. Available as arXiv:1612.07011.
10. *A simplified approach to Fiedler-like pencils via block minimal bases pencils*, with Maribel Bueno, Froilán Dopico, R. Saavedra and B. Zykoski. To appear in *Linear Algebra and its Applications*, 2018. Available as arXiv:1611.07170.
11. *Mixed forward-backward stability of the two-level orthogonal Arnoldi method for quadratic problems*, with Karl Meerbergen. To appear in *Linear Algebra and its Applications*, 2018. Available as arXiv:1707.00930.

### Submitted papers and Preprints

1. *Automatic rational approximation and linearization of nonlinear eigenvalue problems*, with Pieter Lietaert, Bart Vandereycken, and Karl Meerbergen. Available as arXiv:1801.08622.
2. *Explicit block-structures for block-symmetric Fiedler-like pencils*, with Maribel Bueno, M. Martin, A. Song, and I. Viviano. Available as arXiv:1711.06300.

### Technical Reports

1. *Technical report on backward stability of polynomial root-finding using Fiedler companion matrices*. Available as MIMS EPrint 2014.38, School of Mathematics, The University of Manchester, UK, 2014.
2. Conditioning and backward errors of polynomial eigenvalue problems solved via a sparse linearization of Hermite interpolation polynomials, with Heike Fassbender, and Nikta Shayanfar. Available as MIMS EPrint 2015.98, School of Mathematics, The University of Manchester, UK, 2015.
3. Symmetric and skew-symmetric block Kronecker linearizations, with Heike Fassbender, and Nikta Shayanfar. Available as arXiv:1606.01766.

## CONTRIBUTED TALKS AT CONFERENCES

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| <i>Structured backward error analysis of linearized structured polynomial eigenvalue problems</i>  | June 2017    |
| Householder meeting, USA   |              |
| <i>Fiedler-Chebyshev pencils</i>   | June 2016    |
| ALAMA meeting,<br>León, Spain  |              |
| <i>Fiedler-like pencils and backward stability of polynomial eigensolvers using linearizations</i> | January 2016 |

- Joint Mathematics Meetings,  
Seattle, USA
- Chebyshev rootfinding via computing eigenvalues of colleague matrices* October 2015  
SIAM Conference on Applied Linear Algebra,  
Atlanta, USA
- Pseudospectra and eigenvalue condition numbers of Fiedler companion matrices* June 2015  
26th Biennial Numerical Analysis Conference,  
University of Strathclyde, Glasgow, UK
- On the backward stability of computing polynomial eigenvalues via colleague matrices* May 2015  
Conference in Honor of Volker Mehrmann on the Occasion of his 60th Birthday,  
TU Berlin, Berlin, Germany
- Backward stability of polynomial root-finding using Fiedler companion matrices* August 2014  
19th Conference of the International Linear Algebra Society,  
Seoul, Korea
- Backward stability of polynomial root-finding using Fiedler companion matrices* July 2014  
Joint ALAMA-GAMM/ANLA 2014 Meeting,  
Universitat Politècnica de Catalunya, Barcelona, Spain
- New bounds for roots of polynomials from Fiedler companion matrices* June 2013  
18th Conference of the International Linear Algebra Society,  
Providence, RI, USA
- Sensitivity Problems for Fiedler Matrices* September 2012  
Workshop of Young Researchers in Mathematics,  
Universidad Complutense de Madrid, Madrid, Spain
- Condition Numbers of Fiedler Companion Matrices* June 2012  
ALAMA 2012 Meeting,  
Leganés, Spain
- Condition Numbers of Fiedler Companion Matrices* August 2011  
17th Conference of the International Linear Algebra Society,  
Braunschweig, Germany

## INVITED TALKS AT CONFERENCES

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- Global and structured backward error analysis of structured polynomial eigenvalue problems solved via structure-preserving linearizations* July 2017  
The 21th ILAS Conference 2017, USA  
Invited talk in the minisymposium “Matrix polynomials”
- Structured and unstructured backward error analyses of linearized polynomial eigenvalue problems* June 2017  
CEDYA–CMA 2017, Cartagena, Spain  
Invited talk in the minisymposium “Conditioning and Perturbation of Matrices”
- Backward error analysis of computing roots of polynomials as generalized eigenvalues* July 2016  
The 20th ILAS Conference 2016, Leuven, Belgium  
Invited talk in the minisymposium  
“Matrix structures and univariate polynomial rootfinding”
- Backward stability of polynomial root-finding using Fiedler companion matrices* April 2014  
Manchester Workshop on Nonlinear Eigenvalue Problems,  
The University of Manchester, UK, April 23-25, 2014  
Invited by Françoise Tisseur

**OTHER INVITED TALKS**

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- When solving polynomial eigenvalue problems via block Kronecker linearizations is backward stable?* March 2016  
 Department of Mathematical Sciences, University of Montana, USA  
 Invited by Emily Stone
- Computing roots of polynomials: a numerical linear algebra point of view* January 2016  
 Department of Mathematical Sciences, Essex University, UK  
 Invited by Vanni Noferini
- Fiedler companion matrices: structural and numerical properties* June 2015  
 Colloquium,  
 Department of Mathematics, Universidad Carlos III de Madrid, Spain  
 Invited by Froilán M. Dopico
- On the stability of computing (matrix) polynomial roots via colleague matrices* May 2015  
 Institut Computational Mathematics, AG Numerik,  
 Technische Universität Braunschweig, Germany  
 Invited by Heike Fassbender

**DEPARTMENTAL AND OTHER TALKS**

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- Krylov methods for solving nonlinear eigenvalue problems. Part II* October 2017  
 Department of Mathematical Sciences, University of Montana
- Krylov methods for solving nonlinear eigenvalue problems. Part I* September 2017  
 Department of Mathematical Sciences, University of Montana
- Recent advances on the theory of linearizing matrix polynomials* December 2016  
 Computer Science Department, KU Leuven
- Constructing strong linearizations of matrix polynomials* October 2015  
 Numerical Linear Algebra meeting,  
 School of Mathematics, The University of Manchester
- On the stability of computing (matrix) polynomial roots via colleague matrices* November 2014  
 Numerical Linear Algebra meeting,  
 School of Mathematics, The University of Manchester
- Computing roots of polynomials as eigenvalues of Fiedler companion matrices* July 2013  
 SIAM Gene Golub Summer School 2013,  
 University of Shanghai
- Sensitivity Problems for Fiedler Matrices* April 2012  
 Colloquium,  
 Department of Mathematics, Universidad Carlos III de Madrid

**MINISYMPOSIA ORGANIZED**

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- Polynomial and Rational Matrices* May 2018  
 SIAM Conference on Applied Linear Algebra, Hong Kong Baptist University
- Conditioning and Perturbation of Matrices* June 2017  
 CEDYA-CMA 2017, Cartagena, Spain
- Polynomial and Rational Eigenvalue Problems* July 2016  
 20th Conference of the International Linear Algebra Society,  
 Leuven, Belgium

## AWARDS AND HONORS

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### Early career travel award to attend

**The SIAM Conference on Applied Linear Algebra (LA18)** May 2018  
Up to \$950 for travel expenses and local accommodation.

**Organization committee of the 21st Conference of the ILAS Society** July 2017  
Local accommodation expenses fully covered.

**Universidad Carlos III of Madrid** 2012-2014  
During this period I received four letters from the Universidad Carlos III de Madrid congratulating my outstanding ratings in the student surveys of teacher evaluation.

**Organization committee of the 19th Conference of the ILAS Society** August 2014  
Local accommodation expenses fully covered.

**Organization committee of the Gene Golub SIAM Summer School** July 2013  
Local accommodation and meals expenses fully covered.  
Up to \$1100 for travel expenses.

**Organization committee of the the Second ALAMA Course on Matrix Polynomials** May 2013  
Local accommodation and travel expenses fully covered.

**Organization committee of the Gene Golub SIAM Summer School** June 2010  
Up to €650 for travel and accommodation expenses.

**Ministry of Education and Science of Spain** 2009  
Research grant of €3000.

## TEACHING EXPERIENCE

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### Instructor, University of Montana

*Linear Algebra* Spring 2018  
*Calculus I* Spring 2018  
*Calculus I* (2 sections) Fall 2017

### Teaching Assistance, KU Leuven (Belgium)

*Genetic Algorithms and Evolutionary Computing* (2 sections) Fall 2016

### Teaching Assistance, The University of Manchester (UK)

*Foundational course in Logic and Set Theory* Winter 2015  
*Foundational course in Calculus and Algebra* Fall 2015  
*Foundational course in Probability Theory and Linear Algebra* Fall 2015  
*Foundational course in Newtonian Mechanics* Fall 2015

### Teaching Assistance, Universidad Carlos III de Madrid (Spain)

*Multivariable Calculus* (3 sections) Fall 2014  
*Multivariable Calculus* (2 sections) Fall 2013  
*Numerical Methods for Engineers* Winter 2013  
*Linear Algebra* (2 sections) Winter 2012

## **SERVICE TO THE DEPARTMENT AND PROFESSION**

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Session facilitator at Montana Math Day for secondary students (2017). Session title: “hexaflexagons”

## **MEMBERSHIPS**

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I am a member of the following professional bodies.

- ILAS (International Linear Algebra Society)
- SIAM (Society for Industrial and Applied Mathematics)
- Spanish Thematic Network ALAMA (Linear Algebra, Matrix Analysis, and Applications)

## **REFEREEING**

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I have refereed for the following journals:

- Linear Algebra and its Applications
- Mathematics of Computation
- SIAM Journal on Matrix Analysis and Applications
- Applied Mathematics and Computation
- Linear and Multilinear Algebra