

# Curriculum Vitae

Jose E. Roman

D. Sistemes Informàtics i Computació  
Universitat Politècnica de València  
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**Personal Info** Citizenship: Spanish.  
Born March 10, 1971 in Alcoi.

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**Research Interests** Numerical solution of large-scale sparse eigenvalue problems.  
Software engineering for large-scale scientific computing.  
General: numerical linear algebra, PDE's, high performance computing.

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**Education** Llicenciat en Informàtica (5-year degree), Universitat Politècnica de València, March 1996.  
Doctor en Informàtica (PhD), Universitat Politècnica de València, February 2003.  
Thesis title: “Software portable, escalable y extensible para la resolución de problemas de valores propios dispersos de gran dimensión”. Advisors: V. Hernández, V. Vidal. Defense committee: A. Vidal, L. Nuño, E. L. Zapata, R. Ralha, T. Drummond

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**Positions** **Current:** Full Professor (CU), Universitat Politècnica de València, since 3/2019.  
Associate Professor (TU), Universitat Politècnica de València, 7/2008–3/2019.  
Assistant Professor (TEU), Universitat Politècnica de València, 5/2003–7/2008.  
Lecturer (AYEU), Universitat Politècnica de València, 10/2000–5/2003.

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**Research Visits** Mathematics and Computer Science Division, Argonne National Laboratory, Jul–Sep 2001.  
Computational Research Division, Lawrence Berkeley National Laboratory, Oct 2001.  
MATHICSE, Ecole Polytechnique Fédérale de Lausanne, Feb–Apr 2013 (host D. Kressner).

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**Research Grants** “Técnicas de aceleración para algoritmos de cálculo de valores propios en SLEPc,” Generalitat Valenciana, GV06-091, Role: Principal Investigator, 2006-2007.  
“Numerical methods for spectral computations: development and implementation in parallel computers,” MEC (Acción Integrada), HP2006-0004, Role: Co-Principal Investigator, 2007-2008.  
“Métodos avanzados y técnicas computacionales novedosas para la resolución numérica de problemas de valores propios de gran dimensión,” MICINN (PNIDI), TIN2009-07519, Role: Principal Investigator, 2010-2012.  
“Técnicas avanzadas de computación paralela para la gestión dinámica de recursos en redes de

comunicaciones móviles,” UPV, PAID-05-10-0200, Role: Principal Investigator, 2011.

“De plataformas paralelas tradicionales a entornos de computación GPU y *cloud*—un caso de estudio de computación espectral,” MICINN (PNIDI-Programa de Internacionalización), AIC10-D-000600, Role: Co-Principal Investigator, 2011.

“Extending the SLEPc library for matrix polynomials, matrix functions and matrix equations in emerging computing platforms,” MEC (PEICTI), TIN2013-41049-P, Role: Principal Investigator, 2014-2016.

“Highly scalable eigensolvers in the context of the SLEPc library,” Agencia Estatal de Investigación, TIN2016-75985-P, Role: Principal Investigator, 2017-2019.

“Parallel algorithms and software for algebraic methods in data analytics,” Agencia Estatal de Investigación, PID2019-107379RB-I00, Role: Principal Investigator, 2020-2022.

“Parallel algorithms and software for spectral computations in computational physics applications,” Agencia Estatal de Investigación, PID2022-139568NB-I00, Role: Principal Investigator, Sep 2023-Aug 2026.

“ISOLV-BSE: Iterative solvers for pseudo-Hermitian eigenproblems with application to large-scale Bethe-Salpeter equations,” innovation study ID Inno4scale-202301-086 funded by the EuroHPC Joint Undertaking, Role: Principal Investigator, Feb 2024-Jan 2025.

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**PhD Supervision** Andrés Tomás, *Implementación paralela de métodos de Krylov con reinicio para problemas de valores propios y singulares*, together with V. Hernández. U. Politècnica de València, May 2009.

Eloy Romero, *Parallel implementation of Davidson-type methods for large-scale eigenvalue problems*. U. Politècnica de València, March 2012.

Carlos Campos, *Algoritmos de altas prestaciones para el cálculo de la descomposición en valores singulares y su aplicación a la reducción de modelos de sistemas lineales de control*, together with R. Ralha. U. Politècnica de València, December 2014.

David Guerrero, *Algoritmos paralelos para la reducción de sistemas lineales de control estables*. U. Politècnica de València, December 2015.

Carmen Campos, *Implementación paralela de métodos iterativos para la resolución de problemas polinómicos de valores propios*. U. Politècnica de València, July 2017.

Alejandro Lamas Daviña, *Dense and sparse parallel linear algebra algorithms on graphics processing units*. U. Politècnica de València, October 2018.

Blanca Mellado Pinto, *ongoing*.

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**Journal Articles** [1] V. Hernandez and J. E. Roman. High-quality computational tools for linear-algebra problems in FEM electromagnetic simulation. *IEEE Antennas Propag.*, 46(6):110–119, 2004. [DOI](#)

[2] V. Hernandez, J. E. Roman, and V. Vidal. SLEPc: A scalable and flexible toolkit for the solution of eigenvalue problems. *ACM Trans. Math. Software*, 31(3):351–362, 2005. [DOI](#)

[3] V. Hernández, J. E. Román, and A. Tomás. Parallel Arnoldi eigensolvers with enhanced scalability via global communications rearrangement. *Parallel Comput.*, 33(7-8):521–540, 2007. [DOI](#)

[4] V. Hernández, J. E. Román, and A. Tomás. A robust and efficient parallel SVD solver based on restarted Lanczos bidiagonalization. *Electron. Trans. Numer. Anal.*, 31:68–85, 2008. [URL](#)

[5] D. Gilbert, J. E. Roman, W. J. Garland, and W. F. S. Poehlman. Simulating control rod and fuel assembly motion using moving meshes. *Ann. Nucl. Energy*, 35(2):291–303, 2008. [DOI](#)

[6] G. Verdú, D. Ginestar, J. Román, and V. Vidal. 3D alpha modes of a nuclear power reactor. *J. Nucl. Sci. Technol.*, 47(5):501–514, 2010. [DOI](#)

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- [8] J. E. Roman, M. Kammerer, F. Merz, and F. Jenko. Fast eigenvalue calculations in a massively parallel plasma turbulence code. *Parallel Comput.*, 36(5-6):339–358, 2010. [DOI](#)
- [9] E. Ramos, J. E. Roman, S. Cardona-Serra, and J. M. Clemente-Juan. Parallel implementation of the MAGPACK package for the analysis of high-nuclearity spin clusters. *Comput. Phys. Commun.*, 181(12):1929–1940, 2010. [DOI](#)
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- [11] E. Romero and J. E. Roman. Computing subdominant unstable modes of turbulent plasma with a parallel Jacobi-Davidson eigensolver. *Concur. Comp.-Pract. E.*, 23(17):2179–2191, 2011. [DOI](#)
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- [13] C. Campos and J. E. Roman. Strategies for spectrum slicing based on restarted Lanczos methods. *Numer. Algorithms*, 60(2):279–295, 2012. [DOI](#)
- [14] M. Schauer, J. E. Roman, E. S. Quintana-Ortí, and S. Langer. Parallel computation of 3D soil-structure interaction in time domain with a coupled FEM/SBFEM approach. *J. Sci. Comput.*, 52(2):446–467, 2012. [DOI](#)
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- [18] E. Romero and J. E. Roman. A parallel implementation of Davidson methods for large-scale eigenvalue problems in SLEPc. *ACM Trans. Math. Software*, 40(2):13:1–13:29, 2014. [DOI](#)
- [19] D. Kressner and J. E. Roman. Memory-efficient Arnoldi algorithms for linearizations of matrix polynomials in Chebyshev basis. *Numer. Linear Algebra Appl.*, 21(4):569–588, 2014. [DOI](#)
- [20] E. Ramos, J. E. Roman, A. Abarca, R. Miró, and J. A. Bermejo. Control rod drop transient analysis with the coupled parallel code pCTF-PARCSv2.7. *Ann. Nucl. Energy*, 87(2):308–317, 2016. [DOI](#)
- [21] A. Bernal, J. E. Roman, R. Miró, D. Ginestar, and G. Verdú. Development of a finite volume inter-cell polynomial expansion method for the neutron diffusion equation. *J. Nucl. Sci. Technol.*, 53(8):1212–1223, 2016. [DOI](#)
- [22] C. Campos and J. E. Roman. Restarted Q-Arnoldi-type methods exploiting symmetry in quadratic eigenvalue problems. *BIT Numer. Math.*, 56(4):1213–1236, 2016. [DOI](#)
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- [28] A. Lamas Daviña, E. Ramos, and J. E. Roman. Optimized analysis of isotropic high-nuclearity spin clusters with GPU acceleration. *Comput. Phys. Commun.*, 209:70–78, 2016. [DOI](#)
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- [47] P. B. Vasconcelos, J. E. Roman, and J. M. A. Matos. Solving differential eigenproblems via the spectral Tau method. *Numer. Algorithms*, 92(3):1789–1811, 2023. [DOI](#)
- [48] A. Nicolet, G. Demésy, F. Zolla, C. Campos, J. E. Roman, and C. Geuzaine. Physically agnostic quasi normal mode expansion in time dispersive structures: From mechanical vibrations to nanophotonic resonances. *Eur. J. Mech. A-Solids*, 100:104809, 2023. [DOI](#)
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- [50] V. Hiremath and J. E. Roman. Acoustic modal analysis with heat release fluctuations using nonlinear eigensolvers. *Appl. Math. Comput.*, 458:128249, 2023. [DOI](#)
- [51] J. E. Roman, F. Alvarruiz, C. Campos, L. Dalcin, P. Jolivet, and A. Lamas Daviña. Improvements to SLEPc in releases 3.14–3.18. *ACM Trans. Math. Software*, 49(3):29:1–29:11, 2023. [DOI](#)
- [52] F. Alvarruiz, C. Campos, and J. E. Roman. Thick-restarted joint Lanczos bidiagonalization for the GSVD. *J. Comput. Appl. Math.*, 440:115506, 2024. [DOI](#)

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**Refereed  
 Proceeding  
 Papers**

- [1] V. Hernández, A. Vidal, I. Blanquer, J. E. Román, S. Flich, J. Muñoz-Cobo, G. Verdú, X. Sancho, A. Escrivá, J. Serra, and A. Gómez. A PVM parallel implementation of the nuclear transient analysis code TRAC-BF1. In L. Vázquez, F. Tirado, and I. Martín, editors, *Supercomputation in Nonlinear and Disordered Systems: Algorithms, Applications and Architectures*, pages 310–313. World Scientific, 1997. [DOI](#)
- [2] D. Guerrero, V. Hernández, J. E. Roman, and A. M. Vidal. Parallel algorithms for the Cholesky factor of generalized Lyapunov equations. *IFAC Proceedings Volumes*, 31(4):201–206, 1998. 5th IFAC Workshop on Algorithms & Architectures for Real Time Control (AARTC’98), Cancun, Mexico, 15-17 April 1998. [DOI](#)
- [3] V. Hernández, J. E. Román, A. M. Vidal, and V. Vidal. Calculation of lambda modes of a nuclear reactor: a parallel implementation using the implicitly restarted Arnoldi method. In J. M. L. M. Palma, J. Dongarra, and V. Hernández, editors, *Third International Conference for Vector and Parallel Processing–VECPAR’98*, volume 1573 of *Lect. Notes Comp. Sci.*, pages 43–57. Springer, 1999. [DOI](#)
- [4] E. Arias, V. Hernández, J. E. Román, A. M. Vidal, R. Torres, I. Montón, F. Chinesta, A. Poitou, and F. Meslin. HIPERPLAST: An HPCN simulator for reinforced thermoplastics injection processes. In E. H. D’Hollander, G. R. Joubert, F. J. Peters, and H. J. Sips, editors, *Parallel Computing: Fundamentals and Applications*, pages 63–70. Imperial College Press, 2000. [DOI](#)

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- [9] M. Caballer, V. Hernández, and J. E. Román. A grid-enabled scene rendering application. In M. Bubak, G. D. van Albada, P. M. A. Sloot, and J. Dongarra, editors, *International Conference on Computational Science*, volume 3038 of *Lect. Notes Comp. Sci.*, pages 54–57. Springer, 2004. [DOI](#)
- [10] L. A. Drummond, V. Hernandez, O. Marques, J. E. Roman, and V. Vidal. A survey of high-quality computational libraries and their impact in science and engineering applications. In M. J. Daydé, J. Dongarra, V. Hernandez, and J. M. L. M. Palma, editors, *High Performance Computing for Computational Science–VECPAR 2004*, volume 3402 of *Lect. Notes Comp. Sci.*, pages 37–50. Springer, 2005. [DOI](#)
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<b>Lecture Notes</b>	[1] J. E. Roman, J. M. Alonso, F. Alvarruiz, I. Blanquer, D. Guerrero, J. Ibañez and E. Ramos. Ejercicios de Programación Paralela con OpenMP y MPI. Editorial UPV, 2018.
<b>Teaching Undergrad.</b>	UPV–Degree in Computer Science: Computación numérica 2000–2009; Algoritmos numéricos 2003–2011; Computación paralela 2012–; Computación científica 2013– UPV–Degree in Engineering Physics: Computación 2023–
<b>Teaching Graduate</b>	UPV–Master in Cloud and High-Performance Computing: Tecnología de la programación paralela 2006–2016; Gestión y visualización de datos en computación científica 2006–2016; Conceptos y métodos de la computación paralela 2019– UPV–Master in Computational Fluid Mechanics: High performance computing environments 2022– CUJAE (Cuba): graduate course ‘Computación de altas prestaciones en problemas estáticos y dinámicos de gran dimensión’, Jun 2004. U. Autónoma de Barcelona: seminar on ‘Introduction to PETSc programming’ in MSc program ‘Ciencia e Ingeniería Computacional’, Feb 2010 and Feb 2011. Umeå U.: PhD course ‘High Performance Computing II’, organized by B. Kågström, Mar 2014. U. Autónoma de Madrid: seminar on ‘Parallel computing and programming’ in MSc program on ‘Theoretical Chemistry and Computational Modelling’, Sep 2019.
<b>Invited Talks</b>	The Mathematics of Chemical Reactivity, Castro Urdiales (Spain), Jun 2009. Physical and Mathematical Challenges in Light of ITER, Marseille, Oct 2009. Barcelona Supercomputing Center, seminar on ‘Parallel Simulations in the Network’, Zaragoza, Nov 2010. Numerical Solution of PDE Eigenvalue Problems, Oberwolfach, Nov 2013. NLAHPC, Numerical Linear Algebra and High Perf. Computing, Hsinchu (Taiwan), Dec 2013. EPASA2014, Eigenvalue Problems: Algorithms, Software and Applications, in Petascale Computing, Tsukuba (Japan), Feb 2014. RES Engineering Seminar 2014, Barcelona, Sep 2014. Celebrating 20 Years of Computational Science with PETSc, Argonne, IL, Jun 2015. 10th RES Users Conference, León, Sep 2016. MACUMB: Massive Computation for Ultrafast Molecular Breaking, Madrid, May 2017. EPASA2018, Eigenvalue Problems: Algorithms, Software and Applications, in Petascale Computing, Tsukuba (Japan), Mar 2018. Advanced theoretical and numerical methods for waves in structured media, Paris, Mar 2018. ATAT 2018: Advanced Topics and Auto Tuning in High-Performance Scientific Computing, Tainan (Taiwan), Mar 2018. SYMCOMP 2019: 4th Int. Conf. on Numerical and Symbolic Computation: Developments and Applications, Porto, Apr 2019. Jornadas ALAMA 2019 (Álgebra Lineal, Análisis Matricial y Aplicaciones), Valencia, Jun 2019. Instituto de Física Fundamental, CSIC, Madrid, Jan 2022. Challenges and Advances in Solving Eigenproblems for Electronic-Structure Theory, CECAM, Laussane, Nov 2022.



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**Professional  
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Journal referee: ACM Trans. Math. Softw., ACM Trans. Parall. Comput., SIAM J. Sci. Comput., Parallel Comput., Numer. Linear Algebra Appl., Numer. Math., BIT Numer. Math., J. Comput. Phys., J. Comput. Math., J. Sci. Comput., J. Comput. Appl. Math., Comput. Phys. Commun., Comput. Math. Appl., Comput. Stat., Calcolo, Int. J. High Perform. C., J. Supercomput., Appl. Math. Comput., IEEE T. Parall. Distrib. Sys., IEEE T. Pattern Anal., Adv. Eng. Softw., Sci. Comput. Program., Comput. Math. Meth., Comput. Mech., Springer Plus.

Conference referee: Euro-Par 2005, 2014, VECPAR 2004, 2006, 2008, PARA 2008, ICCS 2018.

Programme Committee member: Parallel Matrix Algorithms and Applications (PMAA), 2008, 2010, 2012, 2014, 2016, 2018, 2020; HPC Asia 2018, 2019, 2020.

Co-organizer: EPSA 2007 (*Eigenvalue Problems: Software and Applications*), Porto, June 2007.  
Organizing Committee member: VECPAR 2004, AARTC 2000.

Thesis committee member: E. Arias (2003, València), A. Martín (2010, Castelló), M. Baboulin [Habil.] (2012, Paris), M. Trindade (2017, Porto), A. Jamal (2017, Paris), J. A. González Pizarro (2018, Madrid)

Member of the Users Committee of the Spanish Supercomputing Network (CURES), 2017-2019

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**Software**

SLEPc: Scalable Library for Eigenvalue Problem Computations (together with C. Campos, L. Dalcín, E. Romero and A. Tomás), <https://slepc.upv.es>.

PETSc: Portable, Extensible Toolkit for Scientific Computation (together with many others, minor contributions), <https://petsc.org>.

Open MPI (Java bindings, mostly developed by O. Vega-Gisbert), <https://www.open-mpi.org>.