ERIC MIRANDA NEIVA

Postdoc at CIRB - Collège de France - PhD in Applied Mathematics – FEMPAR and Gridap.jl developer

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PUBLICATIONS

Journal Articles

7. S. Badia, E. Neiva, and F. Verdugo, "Linking ghost penalty and aggregated unfitted methods," *Computer Methods in Applied Mechanics and Engineering*, vol. 388, p. 114 232, 2022. DOI: `10.1016/j.cma.2021.114232`

6. S. Badia, A. F. Martín, E. Neiva, and F. Verdugo, "The aggregated unfitted finite element method on parallel tree-based adaptive meshes," *SIAM Journal on Scientific Computing*, vol. 43, no. 3, pp. C203–C234, 2021. DOI: `10.1137/20m1344512`

5. E. Neiva and S. Badia, "Robust and scalable h-adaptive aggregated unfitted finite elements for interface elliptic problems," *Computer Methods in Applied Mechanics and Engineering*, vol. 380, p. 113 769, 2021. DOI: `10.1016/j.cma.2021.113769`

4. S. Badia, A. F. Martín, E. Neiva, and F. Verdugo, "A generic finite element framework on parallel tree-based adaptive meshes," *SIAM Journal on Scientific Computing*, vol. 42, no. 6, pp. C436–C468, 2020. DOI: `10.1137/20M1328786`

3. E. Neiva, M. Chiumenti, M. Cervera, *et al.*, "Numerical modelling of heat transfer and experimental validation in powder-bed fusion with the virtual domain approximation," *Finite Elements in Analysis and Design*, vol. 168, p. 103 343, 2020. DOI: `10.1016/j.finel.2019.103343`

2. E. Neiva, S. Badia, A. F. Martín, and M. Chiumenti, "A scalable parallel finite element framework for growing geometries. application to metal additive manufacturing," *International Journal for Numerical Methods in Engineering*, vol. 119, no. 11, pp. 1098–1125, 2019. DOI: `10.1002/nme.6085`

1. M. Chiumenti, E. Neiva, E. Salsi, *et al.*, "Numerical modelling and experimental validation in selective laser melting," *Additive manufacturing*, vol. 18, pp. 171–185, 2017. DOI: `10.1016/j.addma.2017.09.002`

Submitted

- S. Badia, E. Neiva, and F. Verdugo, "Robust high-order unfitted finite elements by interpolation-based discrete extension," arXiv:2201.06632

SOFTWARE PROJECTS

FEMPAR collaborator

Scientific software for massively-parallel simulations of multiphysics problems governed by PDEs. Implemented in hybrid OpenMP/MPI object-oriented FORTRAN200X and member of the High-Q club of the most scalable European codes.

Since 2016

Gridap.jl collaborator

A feature-rich Finite Element software ecosystem 100% in Julia. Advancing high-order immersed finite elements in `GridapEmbedded.jl` for fluid-structure interaction, fluid-deformable surfaces and coupled bulk-surface problems.

Since 2020

GRANTS

FI-AGAUR predoctoral fellowship

Funded by the Agència de Gestió d'Ajuts Universitaris i de Recerca and the Departament d'Innovació, Universitats i Empresa of the Government of Catalonia. Grant Id. 2017 FI B00219.

2017 – 2020

WORK EXPERIENCE

Postdoctoral researcher at Centre Interdisciplinaire de Recherche en Biologie (CIRB) at Collège de France

Research on trace and coupled surface-bulk unfitted finite elements at TurlierLab to help biologists gain new knowledge on cell morphogenesis

2021 – Present. Paris, France

Postdoctoral researcher at Centre Internacional de Mètodes Numèrics en Enginyeria (CIMNE)

Research on unfitted finite elements to accelerate simulations in industry

2020 – 2021. Barcelona, Spain

Predoctoral fellow at CIMNE

Research on metal additive manufacturing (AM) simulations and work on the AM projects listed in the "Research projects" CV section

2016 – 2020. Barcelona, Spain

Internship at CIMNE

Research on metal additive manufacturing (AM) simulations and work on the AM projects listed in the "Research projects" CV section

2015 – 2016. Barcelona, Spain

Internship at SENER, Ingeniería y Sistemas, S.A.

Assistance in the design of engineering projects and bids in the hydraulic engineering dept.

2013 – 2015. Cerdanyola, Spain.

CV last update: 23/06/2022

CONTRIBUTED TALKS (* = *INVITED*, † = *FUNDED*)

New tools to solve PDEs in Julia with Gridap.jl

JuliaCon 2021

Jul 2021. Online event. **Link to video** (last access: 25/03/2022)

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High-order unfitted finite elements with aggregation by interpolation*

IX International Conference on Computational Methods for Coupled Problems in Science and Engineering

Jun 2021. Online event

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Hierarchical Octrees, Unfitted Methods and Parallel Computing for Metal Additive Manufacturing*,†

XIV World Congress in Civil Engineering and ECCOMAS Congress

Jan 2021. Paris, France. **Link to video** (last access: 25/03/2022)

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An h-adaptive unfitted finite element method for interface elliptic boundary value problems

I Monash WS on Numerical Differential Equations and Applications

Feb 2020. Melbourne, Australia. **Link to slides** (last access: 25/03/2022)

- -

FEMPAR-AM: A parallel FE framework for the simulation of powder-bed metal additive manufacturing processes*,†

II International Conference on Simulation for Additive Manufacturing

Sept 2019. Pavia, Italy.

- -

FEMPAR-AM: Leveraging unfitted finite elements, hierarchical octree meshes and balancing domain decomposition by constraints for digital design and certification in 3D printing with metals†

IX International Congress on Industrial and Applied Mathematics

Jul 2019. Valencia, Spain.

- -

FEMPAR-AM: A parallel Finite-Element Framework for the simulation of Metal Additive Manufacturing†

Additive Manufacturing Benchmarks 2018

Jun 2018. Washington, USA.

- -

Parallel finite-element analysis of heat transfer in AM processes by metal deposition†

I International Conference on Simulation for Additive Manufacturing

Oct 2017. Munich, Germany.

- -

A parallel finite-element framework for the heat transfer analysis of metal additive manufacturing

XIV International Conference on Computational Plasticity

Sept 2017. Barcelona, Spain.

- -

3D Printing with metals: An exciting opportunity for the manufacturing industry

V Interdisciplinary Meeting of Predoctoral Reasearchers

Feb 2017. Barcelona, Spain.

EDUCATION

Ph.D. in Civil Engineering

Universitat Politècnica de Catalunya

2016 – 2020. Barcelona, Spain. *Excellent Cum Laude* with International Doctorate Mention. *Link to thesis*

Advised by: Michele Chiumenti and Santiago Badia

(Oct. 2019 – Mar. 2020) Research visit to the School of Mathematics at Monash University, Melbourne, Australia.

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M.Sc. in Numerical Methods in Engineering

Universitat Politècnica de Catalunya

2014 – 2016. Barcelona, Spain.

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B.Sc. and M.Sc. in Civil Engineering

Universitat Politècnica de Catalunya

2008 – 2015. Barcelona, Spain.

- -

B.Sc. and M.Sc. in Mathematics

Universitat Politècnica de Catalunya

2008 – 2014. Barcelona, Spain.

RESEARCH PROJECTS

Computer-Aided Technologies for Additive Manufacturing (CAxMan)

Funded by the European Commission, under the Horizon 2020 programme. Grant Id. 680448.

2015 – 2018

- -

Efficient Manufacturing for Aerospace Components USing Additive Manufacturing, Net Shape HIP and Investment Casting (EMUSIC)

Funded by the European Commission, under the Horizon 2020 programme. Grant Id. 690725.

2016 – 2019

- -

Computational Framework for Additive Manufacturing of Titanium Alloys (ADaMANT)

Funded by the Spanish Government, under the Proyectos de I+D (Excelencia) programme. Grant Id. DPI2017-85998-P.

2018 – 2020

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CV last update: 23/06/2022