

Jérémy Bleyer
Ecole Nationale des Ponts et Chaussées
Chercheur (HDR) au Laboratoire Navier
Ingénieur en Chef des Ponts, des Eaux et des Forêts
Professeur chargé de cours à l'Ecole Polytechnique

November 18, 2025

Born on July 15th 1988 in Mulhouse, France
Researcher at Laboratoire Navier, École Nationale des Ponts et Chaussées (ENPC)
IP Paris, Université Gustave Eiffel, CNRS, Marne-la-vallée, France

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Current position

2020 – now Part-time Associate Professor at **École Polytechnique**, Mechanical Eng. Dpt.
2017 – now Permanent researcher at **École Nationale des Ponts et Chaussées (ENPC)**
Engineer of *Corps des Ponts, des Eaux et des Forêts*

Previous positions

2016 Postdoctoral researcher at **Ecole Polytechnique Fédérale de Lausanne**,
Switzerland
2015 Visiting scholar (6 weeks) at **University of Newcastle**, Australia
2012–2015 Doctoral researcher at **ENPC**, France

Education and key qualifications

2024 **Habilitation à Diriger des Recherches**¹ (HDR) from Institut Polytechnique de Paris
2012 – 2015 **PhD** from Université Paris-Est, Structures & Materials, (Dir. Patrick de Buhan)
2010 – 2012 **Engineering degree**, ENPC, Civil Engineering Department
2010 – 2011 **M.Sc.**, Mechanics of Materials and Structures, ENPC, with highest honors
2007 – 2010 **Engineering degree**, École Polytechnique, Mechanical Engineering Dpt.

Teaching activities

2020 – now	80h/year at École Polytechnique: Structural and Solid Mechanics (Eng. level)
2017 – now	40h/year at ENPC: Finite-Element Method for Civil Engineering (Eng. level)
2020 – now	Damage Mechanics (Master level), jointly by ENPC/Sorbonne Université
2011-2016	Approx. 100h/year of teaching experience in various courses at ENPC and EPFL, (Solid mechanics, Finite-strain, Plasticity, Fracture Mechanics, etc.)

Fellowships and awards

2023 Jean Mandel Prize	Delivered by École des Mines PSL & École Polytechnique
2016 PhD award	Delivered by Université Paris-Est
2016 PhD award	Delivered by École des Ponts ParisTech
2010 Medal L.E. Rivot	Delivered by the French Academy of Sciences: " <i>particular interest for scientific research and quality of his work in the domain of mechanical and computational sciences</i> "

Finalist of the following PhD awards: Paul Germain (French Association of Mechanics), CSMA (French Association of Computational Mechanics), ECCOMAS Olympiad

Previous grants

- 2025 **ANR MicroExpand** (PRC), *Design and fabrication of deployable micro-architected materials*, PI. Arthur Lebé (ENPC)
- 2025 **ANR ColdWell** (PRME, 600 k€), *Cold CO₂ in Hot Reservoirs: Well Integrity in Carbon Capture and Storage*, PI. Siavash Ghabezloo (ENPC)
- 2024 **ANR Anohona** (PRC, 675 k€), *Advanced nonlinear homogenization for structural analysis*, PI. Noël Lahellec (Aix-Marseille University)
- 2022 **Digital Europe** (7M€) *Digital Twins for Complex Infrastructures and Urban ecosystems*, European consortium, WP leader
- 2021 **Labex MMCD** (100 k€), PhD thesis funding for Zakaria Chafia, with J. Yvonnet (UGE) *Multi-scale modelling strategies for predicting the failure behaviour of cementitious materials*
- 2021 **Coup de Pouce Fédération Francilienne de Mécanique** (40 k€), co-PI with S. Brach (X) *Multiphase-field modeling of anisotropic brittle fracture in additively-manufactured polycrystals*

Denied

- 2022 ANR JCJC (PI) OROMIS *Robust optimization for uncertainty quantification in structural design*
- 2020 Nuclear Valley DAS4 *Digitization for Optimization of Nuclear Design and Construction*
- 2017 FEDER Ile de France *Yield design of construction wood assemblies*

Scientific supervision

PhD students

- 2025-now **Ludovic Druette**, *Modeling of the poroplastic behavior of geomaterials*, co-dir. Siavash Ghabezloo, industrial collaboration with EDF R&D
- 2025-now **Esteban Martinez**, *Impacts of remediation and prevention solutions on damage to building structures constructed on soils prone to clay shrinkage-swell*, co-dir. Duc Toan Pham, industrial collaboration with CSTB
- 2024-now **Yahya Boye**, *Hierarchical matrices for accelerating contact in FEM*, dir. Vladislav Yastrebov, MINES Paris PSL

- 2023-now **Alice Gribonval**, *Multiscale and multiphysics modeling of 3D-printed concrete structures*, industrial collaboration with XtreeE
- 2023-now **Giulia d’Orio**, *Reinforced concrete behavior for modeling and safety of nuclear civil engineering structures*, industrial collaboration with EDF R&D
- 2023-now **Gaspard Blondet**, *Advanced modeling of cross-laminated timber panel behavior*, co-dir. Arthur Lebé, fellowship of ENS Paris-Saclay and ENPC
- 2021-2024 **Sabine Boulevard**, *Failure design of reinforced concrete beams subject to shear and torsional loadings in fire conditions*, dir. Duc Toan Pham, industrial collaboration with CSTB
- 2021-2024 **Zakaria Chafia**, *Multi-scale modelling strategies for predicting the failure behaviour of cementitious materials*, dir. Julien Yvonnet (Univ. Gustave Eiffel), funded by LabeX MMCD
- 2020-2023 **Goustan Bacquaert**, *Behaviour of geomaterials for the modeling and safety analysis of geotechnical structures*, dir. Djimédo Kondo (Sorbonne Université), CIFRE funding in collaboration with Électricité de France
- 2018-2021 **Leyla Mourad**, *Topology optimization of structural load-bearing capacity through limit analysis*, dir. Karam Sab, joint thesis with University Saint-Joseph, Lebanon
- 2018-2021 **Paul Bouteiller**, *Failure modeling of composites laminates in a layerwise plate model*, advisor Karam Sab, industrial collaboration with Dassault Aviation
- 2017-2021 **Lucille Salha**, *Mesh adaptation and hybridization for efficient stress prediction in a layerwise plate model*, dor. Karam Sab, joint thesis with University Saint-Joseph, Lebanon
- 2017-2020 **Chadi El Boustani**, *Innovative optimization-based numerical methods for modeling the non-linear behavior of steel structures*, dir. Karam Sab, CIFRE funding in collaboration with Strains
- 2015-2018 **Karol Cascavita**, *Hybrid discretization methods for Signorini contact and Bingham flow problems*, dir. Alexandre Ern and Xavier Chateau, funded by LabeX MMCD
- 2015-2018 **Hugues Vincent**, *Development of a yield design model until failure for 3D reinforced concrete structures*, dir. Patrick de Buhan, CIFRE funding in collaboration with Strains

Postdoctoral fellows

- 2025 **Tongrui Liu**, *Efficient numerical models for the simulation of the mechanical behaviour of composite materials*, joint supervision with M. Bornert, F. Legoll, S. Brisard
- 2021 **Jean-Michel Scherer**, *Multiphase-field modeling of anisotropic brittle fracture in additively-manufactured polycrystals*, joint supervision with Stella Brach (LMS-X), funded by the Coup de Pouce grant from Fédération Francilienne de Mécanique

Others

approx. 12 master internship + 3 visiting PhD students (Hana Herndon, GeorgiaTech; Thomas W. Jensen, DTU; Hannah Keese, TU Freiberg)

Industrial partnerships

Électricité de France, support for Goustan Bacquaert, Giulia d’Oria and Ludovic Druette PhD theses

XtreeE, support for Alice Gribonval PhD thesis

CSTB, support for Sabine Boulevard & Esteban Martinez PhD thesis

Turbostream Ltd, scientific consulting mission

Setec tpi, support for Leyla Mourad PhD thesis

Dassault Aviation, support for Paul Bouteiller PhD thesis

Strains, support for Chadi El Boustani and Hugues Vincent PhD theses + scientific consulting mission

Invitations

- 2025 **Workshop** Fronts, organized by Prof. J.F. Remacle and N. Moës, Creta, Greece
- 2023 **Workshop** CSMA Juniors
Hands-on session: Introduction to FEniCSx
- 2023 **Workshop** Fronts, organized by Prof. J.F. Remacle and N. Moës, Université Catholique de Louvain, Belgium
- 2022 **Workshop** Homogenization and optimization of polymers, Ecole Polytechnique
Conic programming approach for the simulation and optimization of nonlinear membranes
- 2020 **Workshop** Design challenges of 3D printing in the construction industry
Topology optimization for designing structures with optimal load-bearing capacity
- 2020 **Workshop** ENPC-University of Tokyo
An overview of computational limit analysis for civil engineering applications
- 2019 **Workshop** RAM3 - Recent Advances in Mechanics and Mathematics of Materials
An overview of computational limit analysis for civil engineering applications
- 2015 **Visit (6 weeks)** to University of Newcastle, Australia, with K. Krabbenhoft and A. Lyamin

Invited seminars at CEA, EDF, LMS (Ecole Polytechnique), GeM (Centrale Nantes), University of Luxembourg, LMA (Aix-Marseille University), INRIA Grenoble, Leibniz Universität Hannover

Reviewing activities

Reviewer (approx. 15/year) for Journal of the Mechanics and Physics of Solids, Computer Methods in Applied Mechanics and Engineering, International Journal for Numerical Methods in Engineering, International Journal of Fracture, International Journal of Solids and Structures, Engineering Fracture Mechanics, Engineering Structures, European Journal of Mechanics - A/Solids, etc.

Reviewer for SIGGRAPH conference (*Computer Graphics most prestigious conference*)

External reviewer for 1 ERC grant (2024), 2 proposals for national science funds (Israël, Austria)

PhD thesis committees

International

- 2023 **Sindhu Nagaraja**, ETH Zürich
Phase-field modeling of brittle fracture: anisotropy and efficient discretization
Jury: Corrado Maurini, Jérémy Bleyer, Laura de Lorenzis, Aldo Steinfeld
- 2017 **Morten A. Herfelt**, Technical University of Denmark
Numerical limit analysis of precast concrete structures
Jury: Henrik Stang, Jérémy Bleyer, Bent Steen Andreasen, Peter Noe Poulsen, Linh Cao Hoang, Jesper Frøbert Jensen

France

- 2025 **Lucas Salmon**, Aix-Marseille University
Multiphysics modeling of crack-healing in a thermoelastic medium: application to the behavior of nuclear fuels
Jury: Yann Monerie, Jérémy Bleyer, Djimédo Kondo, Véronique Lazarus, Laurent Stainier, Victor Blanc, Mihail Garajeu, Stéphane Lejeunes

- 2025 **Lamia Mersel**, Ecole Centrale de Nantes
Phase field model for dynamic damage and fracture analysis through a fully explicit time integration
 Jury: Djimédo Kondo, Jérémy Bleyer, Thomas Heuzé, Anthony Gravouil, Bing Tie, Pascal Bouda, Jérémy Germain, Julien Réthoré
- 2025 **Laurane Preumont**, Ecole Polytechnique - IP Paris
Fast enriched mechanical model for bead-based additive manufacturing
 Jury: Armelle Chabot, Jérémy Bleyer, Barbara Wolmuth, Claire Lestringant, Daniel Weisz-Patrault, Grégoire Allaire
- 2024 **Zakaria Chafia**, Université Gustave Eiffel
Numerical multiscale strategies and High Performance Computing for predicting the fracture behaviour of heterogeneous materials
 Jury: Laura De Lorenzis, Julien Réthoré, Anthony Gravouil, Johann Rannou, Jérémy Bleyer, Julien Yvonnet
- 2024 **Sabine Boulevard**, Ecole Nationale des Ponts et Chaussées
Shear and torsion strength of reinforced concrete structural elements in fire conditions
 Jury: Mohammed Hjiar, Anne-Sophie Colas, Stefano Dal Pont, Jérémy Bleyer, Karam Sab, Duc Toan Pham
- 2024 **Gabriel Lima Chaves**, Ecole Polytechnique - IP Paris
On the thermomechanics of field dislocations
 Jury: Thomas Hochrainer, Vincent Taupin, Samuel Forest, Jérémy Bleyer, Konstantinos Danas, Katrin Schulz, Lev Truskinovsky, Manas Upadhyay
- 2024 **Nikhil Mohanan**, Ecole Polytechnique - IP Paris
On the intergranular response during laser scanning of additively manufactured stainless steel: a thermomechanical simulation study
 Jury: Laurent Delannay, Vincent Taupin, Anna Ask, Eric Charkaluk, Martin Diehl, Maurine Montagnat, Javier Segurado, Jeremy Bleyer, Nicolò Grilli, Thomas Helfer, Manas Upadhyay
- 2023 **Xinyuan Zhai**, ENSTA ParisTech - IP Paris
Crack propagation in elastic media with anisotropic fracture toughness : experiments and phase-field modeling
 Jury: Corrado Maurini, Benoit Roman, Jeremy Bleyer, Fabien Szmytka, Véronique Lazarus, Stella Brach, Thomas Corre, Andrés A. León Baldelli
- 2023 **Goustan Bacquaert**, Sorbonne Université
Behavior of geomaterials for modeling and safety of geotechnical structures
 Jury: Pierre Besuelle, Laurent Stainier, Samuel Forest, Laura de Lorenzis, Jean-Jacques Marigo, François Voldoire, Jeremy Bleyer, Djimédo Kondo, Corrado Maurini, Vinicius Alves-Fernandes, Simon Raude
- 2023 **David Siedel**, Mines Paris - PSL
A robust numerical approach for the description of brittle fracture and viscoplastic behavior of fuel rods
 Jury: Riccardo Rossi, Sylvain Drapier, Vanessa Lleras, Djimédo Kondo, Jérémy Bleyer, Jacques Besson, Thomas Helfer, Olivier Fandeur, Samuel Forest, Nicolas Pignet
- 2022 **Salim Chaibi**, ISAE Toulouse
Prediction of low-velocity/low-energy impact damages in the latest generation of carbon-epoxy laminated composites
 Jury: Emmanuelle Abisset, Peter Davies, Rodrigue Desmorat, Zoheir Aboura, Jérémy Bleyer, Carlos G. Dávila, Johann Rannou, Christophe Bouvet.
- 2022 **Paul Bouteiller**, ENPC
Simulation of laminate composite failure using stress-based layerwise plate models

- Jury: Véronique Lazarus, Federica Daghia, Corrado Maurini, Johann Rannou, Christophe Bouvet, Fabrice Congourdeau, Jérémy Bleyer, Karam Sab.
- 2021 **Leyla Mourad**, ENPC-Université Saint-Joseph (Beyrouth)
Strength-based topology optimization of structures using limit analysis Jury: Fabrice Gatuingt, Boris Desmorat, Grégoire Allaire, Jérémy Bleyer, Romain Mesnil, Joanna Nseir, Karam Sab, Wassim Raphael.
- 2021 **Lucille Salha**, ENPC-Université Saint-Joseph (Beyrouth)
Mesh adaptation and hybridization for efficient stress prediction in a layerwise plate model
 Jury: Toni Sayah, Olivier Polit, Steven Marguet, Jérémy Bleyer, Joanna Bodgi, Karam Sab
- 2020 **Chadi El Boustani**, ENPC *Innovative optimization-based numerical methods for modeling the non-linear behavior of steel structures* Jury: Habibou Maitournam, Nicolas Moës, Mohammed Hjiaj, Mickaël Abbas, Laurence Davaine, Jérémy Bleyer, Xavier Cespèdes, Karam Sab
- 2019 **Mohammad El Hajj Diab**, IFSTTAR *Analysis of structural robustness : characterization of accidental/exceptional events and of their impacts on infrastructures* Jury: Stéphane Grange, Alan O'Connor, Mohammed Hjiaj, Jérémy Bleyer, Robby Caspeele, Jean-François Demonceau, Cédric Desprez, André Orcesi
- 2018 **Karol Cascavita**, ENPC
Hybrid discretization methods for Signorini contact and Bingham flow problems
 Jury: Raphaële Herbin, Pierre Saramito, Patrick Hild, Miguel Angel Fernandez Varela, Erik Burman, Jérémy Bleyer, Xavier Chateau, Alexandre Ern.
- 2018 **Hugues Vincent**, ENPC
Development of a yield design model for 3D reinforced concrete structures
 Jury: Aurelio Muttoni, Samir Maghous, G ry de Saxc , J r my Bleyer, Patrick de Buhan.
- 2018 **Mingguan Yang**, ENPC
Stability of reinforced concrete walls under fire conditions by a yield design approach
 Jury: Jean-Marc Franssen, Fran ois Buyle-Bodin, Mohammed Hjiaj, J r my Bleyer, Duc Toan Pham, Patrick de Buhan.

Participation to councils or committees

Elected member of ENPC Research and Education council
Elected member of Laboratoire Navier council
Member of the Civil Engineering Department council at ENPC
Hiring committee jury member: Sorbonne Universit /Polytech Sorbonne, Ecole Polytechnique, ENSTA

Organization of scientific events

- 2026 **Co-organizer** of the *FEniCS 2026 Conference*, Paris
- 2026 **Co-organizer** (with J.S. Hale, J. Hope-Collins and P. Kerfriden) of the mini-symposium *Advances in Automatic Differentiation in Mechanics* at WCCM 2026, M nich
- 2025 **Co-organizer** (with M. Garcia Alberti and T. Lovas) of the mini-symposium *Digital Twins for Infrastructures and Cities* at DTE & AICOMAS 2025, Paris
- 2023 **Core member** of the *MEALOR II Summer school*
- since 2021 **Core member** of the *GdR MePhy M canique et Physique des Syst mes Complexes*
- 2020 **Co-organizer** (with J.S. Hale and G. Wells) of the mini-symposium *Developments in automatic code-generation software for computational mechanics* at WCCM-ECCOMAS, Paris (online)

Animator of internal laboratory seminars and activities on numerical tools

Software development & Open science principles

I am strongly involved in the FEniCSx users community. I provide regular help on the users forum and I contribute to the ecosystem via the development of the following **open-source projects**:

- *Numerical tours of Computational Mechanics using FEniCSx* form a set of commented demos oriented towards solid and structural mechanics applications².
- `dolfinx_materials`

Repository: https://github.com/bleyerj/dolfinx_materials

Documentation: https://bleyerj.github.io/dolfinx_materials/

- `dolfinx_optim` (formerly `fenics_optim`)

Repository: https://github.com/bleyerj/dolfinx_optim

Documentation: https://bleyerj.github.io/dolfinx_optim/

I am also involved in the development of the `MFrontGenericInterfaceSupport` open-source project lead by Thomas Helfer (CEA).

Outreach

- *Interview La construction, un chantier d'avenir pour la mécanique*, 25 mai 2022. CNRS le Journal, Mécanique : dans l'atelier du futur
- *Article revue Transitions*: Bleyer J., Arquier M., Fliscounakis A., Développement d'outils de calculs innovants dans l'ingénierie de génie civil. *Transitions. Les nouvelles Annales des Ponts et Chaussées*, 2022, Bâtiments et construction en transition, 2, pp.54-59
- *EELISA Innovation Talks/Matinale des Ponts: Digital Twins*, March 28th 2023

Other: Digital Twins for Infrastructures and Cities

Digital Twins for Complex Infrastructures and Urban Ecosystems is a project co-funded by the European Health and Digital Executive Agency, HADEA, under the Digital Europe Programme. The project is partnered by four leading European universities in the fields of Civil Engineering, Architecture and Computer Sciences (UPM Madrid, ITU Istanbul, BME Budapest, ENPC Paris). In 2023, I was acting Academic Director of the Executive Master program associated with this project. I was leading the development of the academic curriculum, entry requirements, learning outcomes, etc. I am now member of the Academic Board and in charge of the conference cycle of the master program.

²Formerly, using the legacy FEniCS package at <https://comet-fenics.readthedocs.io/>