

Roberto Alessi

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Curriculum vitae

Info

born **Rome (Italy), 12/04/1985** marital status **married with two children**

Education

- 2013 **PhD in Structural Mechanics**,
Department of Structural and Geotechnical Engineering, SAPIENZA–Università di Roma
Title of dissertation: Variational Approach to Fracture Mechanics and Plasticity
Supervisors: Prof. J-J. Marigo, Prof. S. Vidoli .
- 2013 **PhD in Mechanics**,
Laboratoire de Mécanique des Solides, Ecole Polytechnique, Paris.
double degree
- 2009 **M.Sc. in Civil Engineering (emphasized Structural Mechanics)**,
SAPIENZA–Università di Roma,
Title of dissertation: *Structural micro-macro modeling of composites materials with carbon nanotubes*
Supervisor: Prof. W. Lacarbonara,
final grade: **110 cum laude/110**.
- 2006 **Bachelor in Civil Engineering**,
SAPIENZA–Università di Roma,
Title of dissertation: *Experimental testing for the characterization of confined concrete*
Supervisor: Prof. F. Braga,
final grade: **110 cum laude/110**.
- 2003 **Scientific High School degree**,
Liceo Scientifico Statale Taletè, Roma, **100 cum laude/100 obtained one year in advance for academic merits**.
- 1989–1998 **Elementary and Secondary school**,
Deutsche Schule Rom (Scuola Germanica di Roma), <http://www.dsrom.de>.

Work experiences

- 2023-today **Assistant Professor with tenure track**,
Department of Civil and Industrial Engineering, University of Pisa,
Starting date: 01/08/2023.
- 2018-2023 **Assistant Professor**,
Department of Civil and Industrial Engineering, University of Pisa,
Starting date: 01/11/2018, ending date 31/07/2023.

- 2016–2017 **Postdoctoral Research Fellow (one year)**,
INdAM (Istituto Nazionale di Alta Matematica).
Research project: Variational modeling of non-local damage and plasticity phenomena for the description of cohesive and ductile fracture
- 2015–2016 **Postdoctoral Research Fellow (one year)**,
Dipartimento di Matematica, SAPIENZA–Università di Roma.
Research project: Variational methods for the study of systems in equilibrium and their fluctuation
- 2013–2015 **Postdoctoral Research Fellow (two years)**,
Dipartimento di Ingegneria Strutturale e Geotecnica, SAPIENZA–Università di Roma.
Research project: Modeling and analysis of multistable shells

Scientific activities

Research contracts

- 2018 **Research contract (five months, 16/04/2018-15/09/2018)**,
Dipartimento di Ingegneria e Architettura, Università di Parma.
Research contract: Leveling instrumentation analysis for bridge monitoring
Scientific director: Prof. F. Freddi
- 2017 **Research contract (one month, 15/05/2017-14/06/2017)**,
Dipartimento di Ingegneria Strutturale e Geotecnica, SAPIENZA-Università di Roma.
Research contract: Hardening effects in variational plasticity models coupled with damage
Scientific director: Prof. S. Vidoli

Conference (organization)

- 2024 **Current Trends in Phase-field Modeling and Computations, 16th World Congress on Computational Mechanics (WCCM2024)**, Vancouver, Canada, organizer together with Fadi Aldakheel, Laura De Lorenzis, Yosef Heider, Emilio Martínez-Pañeda and Thomas Wick.
- 2023 **2nd Workshop on Experimental and Computational Mechanics (WECM'23)**, University of Pisa, Pisa, 21-23 September, member of the local organizing committee.
- 2022 **56th Meeting of the Society for Natural Philosophy (SNP 2022)**, University of Pisa, Pisa, 21-23 September, member of the local organizing committee.
- 2019 **Recent Advances in Mechanics and Mathematics of Materials - 2nd International Meeting of Young Researchers (RAM3)**, SAPIENZA University of Rome, Roma, 18-20 November, organizer together with Prof. Jacopo Ciambella and Prof. Antonino Favata.
- 2019 **Minisymposium: Interface models and phase-field approaches for fracture and damage mechanics, XXIV Congress - Italian Association of Theoretical and Applied Mechanics (AIMETA 2019)**, Rome, 15-19 September, organizer together with Prof. Matteo Brunetti, Prof. Francesco Freddi, Prof. Giovanni Lancioni and Prof. Elio Sacco.
- 2019 **Phase-Field Models in Simulation and Optimization, 9th International Congress on Industrial and Applied Mathematics (ICIAM 2019)**, Valencia, Spain, organizer together with Prof. Thomas Wick e Prof. Winnifried Wollner.
- 2017 **Recent Advances in Mechanics and Mathematics of Materials - A young researchers' meeting (RAM3)**, SAPIENZA University of Rome, Roma, 22-24 November, organizer together with Prof. Jacopo Ciambella and Prof. Antonino Favata.
- 2017 **Minisymposium: Fracture: interface models and phase field approaches, XXIII Congresso - Italian Association of Theoretical and Applied Mechanics (AIMETA 2017)**, Salerno, 4-7 September, organizer together with Prof. Francesco Freddi, Prof. Giovanni Lancioni and Prof. Elio Sacco.

Conferences

- 2024 **Recent advancements and open issues in the variational phase-field modelling of fracture**, 58th Meeting of the Society for Natural Philosophy (SNP 2024), Aarhus, Denmark.
(Selected Speaker)
- 2024 **A unified framework for variational phase-field fracture models**, 9th GAMM Workshop on phase-field modeling, Dresden, Germany.
(Key-note invited Speaker)
- 2023 **How to describe fatigue cracks with Griffith's fracture theory?**, 27th International Conference on Fracture and Structural Integrity (IGF27), Rome, Italy.
(Speaker)
- 2022 **How to update Griffith's brittle fracture theory with the ability to describe fatigue cracks?**, Beyond Elasticity: Advances and Research Challenges, Luminy, France.
(Invited Speaker)
- 2021 **Endow Griffith's brittle fracture theory with the ability to describe fatigue cracks**, Bi-annual congress of the Italian Society of Applied and Industrial Mathematics (SIMAI 2020+2021), Parma, Italy.
(Speaker)
- 2021 **Modeling fatigue effects in brittle materials with a variational phase-field approach**, 25th International Congress of Theoretical and Applied Mechanics (Ictam2020+1), Milano, Italy.
(Speaker)
- 2020 **A phase-field approach to plasticity and fracture for modelling multi-cracking in short fiber-reinforced composites**, IUTAM Symposium: Computational Fracture Mechanics in Multifield Problems, Bad Honnef, Bonn, Germany.
- 2019 **Material internal lengths in the multi-cracking process of fiber-reinforced composites**, XXIV Congresso - Italian Association of Theoretical and Applied Mechanics (AIMETA 2019), Roma, Italy.
(Speaker)
- 2019 **Numerical strategies for J2 phase-field models regularizing shear fracture**, XXIV Congresso - Italian Association of Theoretical and Applied Mechanics (AIMETA 2019), Roma, Italy.
- 2019 **Fatigue effects in elastic materials with variational damage models: A vanishing viscosity approach**, XXIV Congresso - Italian Association of Theoretical and Applied Mechanics (AIMETA 2019), Roma, Italy.
- 2019 **Phase-field modelling of the pseudo-ductile response of hybrid laminates**, XXIV Congresso - Italian Association of Theoretical and Applied Mechanics (AIMETA 2019), Roma, Italy.
- 2019 **Material internal lengths in the multi-cracking process of fiber-reinforced composites**, VI International Conference on Computational Modeling of Fracture and Failure of Materials and Structures (CFRAC 2019), Braunschweig, Germany.
- 2019 **Ductile failure of fiber-reinforced composites: variational model and numerical results**, International Conference on Material Modeling (ICMM6), Lund, Sweden.
- 2019 **A new framework to simulate fatigue fracture in brittle materials**, 90th Annual Meeting of the International Association of Applied Mathematics and Mechanics (GAMM 2019), Vienna, Austria.
- 2019 **A variational phase field model for ductile fatigue**, 90th Annual Meeting of the International Association of Applied Mathematics and Mechanics (GAMM 2019), Vienna, Austria.

- 2019 **Phase-field modeling and simulation of fatigue phenomena in brittle materials**, *90th Annual Meeting of the International Association of Applied Mathematics and Mechanics (GAMM 2019)*, Vienna, Austria.
- 2018 **Modeling of ductile fatigue phenomena with a variational phase-field approach (Invited Speaker)**, *Current trends and open problems in computational solid mechanics*, *Leibniz Universität Hannover*, Hannover, Germany.
(Speaker)
- 2018 **Micro-cracking and Plastic Strains in Fiber-reinforced Concretes: Variational Modeling and Application to Concrete Table Prototypes**, *6th European Conference on Computational Mechanics (ECCM 6)*, Glasgow, UK.
- 2018 **Phase-field modelling of the pseudo-ductile response of hybrid laminates**, *XXII Convegno Nazionale di Meccanica Computazionale (GIMC-GMA 2018)*, Ferrara, Italy.
(Speaker)
- 2018 **Numerical strategies for J2 phase-field models regularizing shear fracture**, *XXII Convegno Nazionale di Meccanica Computazionale (GIMC-GMA 2018)*, Ferrara, Italy.
- 2018 **A variational two-phase model for micro- and macro-cracking in composites, with applications to fiber-reinforced concretes**, *XXII Convegno Nazionale di Meccanica Computazionale (GIMC-GMA 2018)*, Ferrara, Italy.
- 2018 **Phase-field modeling of anisotropic brittle fracture in fiber-reinforced composites**, *13th World Congress in Computational Mechanics (WCCM 2018)*, New York, USA.
- 2018 **A phase-field model for the description of fatigue phenomena**, *89th Annual Scientific Conference of the International Association of Applied Mathematics and Mechanics (GAMM 2018)*, München, Germany.
- 2017 **Modeling fatigue phenomena with a variational phase-field approach (key-note)**, *7th GACM Colloquium on Computational Mechanics (GACM2017)*, Stuttgart, Germany.
- 2017 **Numerical modelling of the pseudo-ductile response of hybrid laminates with a phase-field approach**, *XXIII Congresso - Italian Association of Theoretical and Applied Mechanics (AIMETA 2017)*, Salerno, Italy.
- 2017 **Phase field modelling of failure in hybrid laminates**, *Fifth International Conference on Computational Modeling of Fracture and Failure of Materials and Structures (CFRAC 2017)*, Nantes, France.
- 2017 **A novel variational phase-field model for the description of fatigue phenomena**, *Fifth International Conference on Computational Modeling of Fracture and Failure of Materials and Structures (CFRAC 2017)*, Nantes, France.
- 2016 **A lattice model for carbon nanotubes and graphene**, *Multiscale Innovative Materials and Structures (MIMS16)*, Cetara, Italy.
- 2016 **Numerical experiments of a gradient-damage and plasticity coupled model for the description of cohesive and ductile fractures**, *15th European Mechanics of Materials Conference (EMMC15)*, Brussels, Belgium.
- 2016 **Debonding and fracture of hybrid laminates with cohesive interfacial law: modeling and numerical simulations**, *15th European Mechanics of Materials Conference (EMMC15)*, Brussels, Belgium.
- 2016 **Energetic formulation for rate-independent processes: Remarks on discontinuous evolutions with a simple example**, *15th GAMM-Seminar on Microstructures*, Paris, France.
- 2015 **Variational formulation and stability analysis of a superelastic shape memory alloys model (Colloqui Lagrangiani - invited)**, *Paris, France*.

- 2015 **Debonding and fracture of hybrid laminates with cohesive interfacial law (AIMETA)**, *Genova, Italy*.
- 2015 **Slant-flat-slant fractures: Numerical Simulations with Gradient Damage Variational Models coupled with Plasticity (ESMC)**, *Madrid, Spain*.
- 2014 **Variational approach to damage mechanics with plasticity and nucleation of cohesive cracks**, *XX Convegno Nazionale di Meccanica Computazionale, Cassino, Italy*.
- 2013 **Variational Approach to Ductile Fracture: A Simple Model with Gradient-Damage and Plasticity**, *EUROMECH - Colloquium 548: Direct and variational methods for non-smooth problems in mechanics, Amboise, France*.
- 2013 **Gradient Damage Models with Plasticity**, *IUTAM SYMPOSIUM on materials and interfaces under high strain rate and large deformation, Metz, France*.
- 2012 **Variational Approach to Fracture Mechanics with Plasticity**, *8th European Solid Mechanics Conference (ESMC), Graz, Austria*.

Given Seminars

- 2023 **How to update Griffith's fracture theory and related phase-field models with the ability to describe fatigue cracks?**, *Department of Mathematics and Computer Science "Ulisse Dini", University of Florence, invited by Prof. Giuliano Lazzaroni, Matteo Focardi and Ilaria Lucardesi, Firenze, Italy*.
- 2019 **Open problems in fracture mechanics**, *Department of Materials Science and Engineering, Uppsala University, invited by Prof. Per Isaksson, Uppsala, Sweden*.
- 2018 **Modeling fatigue phenomena with a variational phase-field approach**, *Department of Engineering and Architecture, University of Parma, invited by Prof. Francesco Freddi, Parma, Italy*.
- 2017 **Mechanical response of hybrid laminates with cohesive interface law**, *Dipartimento di Matematica, SAPIENZA-Università di Roma, Roma, Italy*.
- 2016 **Gradient damage models coupled with plasticity**, *Uni-Stuttgart, invited by Prof. Christian Miehe, Stuttgart, Germany*.
- 2015 **Analysis of localization phenomena in Shape Memory Alloys bars: a variational approach**, *Assemblea Scientifica GNFM (invited), Monte Catini Terme, Italy*.
- 2015 **Energetic Formulation for rate-independent systems: remarks on discontinuous evolutions**, *Dipartimento di Matematica, SAPIENZA-Università di Roma, Roma, Italy*.
- 2015 **Variational formulation and stability analysis of a superelastic shape memory alloys model**, *GNFM-Summer School, Ravello, Italy*.
- 2015 **Energetic formulation to damage mechanics with plasticity and nucleation of cohesive cracks**, *Institute of Applied Mechanics, TU-Braunschweig, invited by Prof.ssa Laura De Lorenzis, Braunschweig, Germany*.

Invited Lecturer

- 2016 **Material instabilities**, *Computational Mechanics of Materials and Structures (COMMAS) Summer School, University of Stuttgart, Stuttgart (Germany)*.

Visiting

- 2025 **University of Udine, Polytechnic Department of Engineering and Architecture**, *invited by Prof. Matteo Brunetti, Udine, Italy. February, 4-7.*
- 2019 **SAPIENZA University of Rome, Department of Structural and Geotechnical Engineering**, *invited by Prof. Jacopo Ciambella, Roma, Italy. January, 8-10.*

- 2019 **Uppsala University, Department of Materials Science and Engineering**, *invited by Prof. Per Isaksson*, Uppsala, Sweden.
October, 5 - November 6.
- 2018 **TU-Braunschweig, Institute of Applied Mechanics**, *progetto MIUR-DAAD*, Braunschweig, Germany.
May, 2-22.
- 2018 **Universität Stuttgart, Institute of Applied Mechanics**, *invited by Prof. Marc-André Keip*, Stuttgart, Germany.
February, 20-23.
- 2018 **TU-Braunschweig, Institute of Applied Mechanics**, *MIUR-DAAD project*, Braunschweig, Germany.
March, 12-13.
- 2017 **TU-Braunschweig, Institute of Applied Mechanics**, *MIUR-DAAD project*, Braunschweig, Germany.
March, 12-17 and May, 16-19
- 2016 **TU-Braunschweig, Institute of Applied Mechanics**, *invited by Prof. Laura De Lorenzis (Chair of the institute)*, Braunschweig (Germany).
October, 24-28
- 2016 **Ecole Polytechnique, Laboratoire de Mécanique des Solides**, *invited by Prof. Jean-Jacques Marigo*, Paris (France).
September, 27-30.
- 2016 **Universität Stuttgart, Institute of Applied Mechanics**, *invited by Prof. Christian Miehe (Chair of Material Theory)*, Stuttgart (Germany).
April, 6-13.
- 2015-2016 **ENSTA, Institute of Mechanical Sciences and Industrial Applications**, *invited by Prof. Kim Pham*, Paris (France).
Several periods for a total of 1 month.
- 2015 **TU-Braunschweig, Institute of Applied Mechanics**, *invited by Prof. Laura De Lorenzis (Chair of the institute)*, Braunschweig (Germany).
June, 26 - July, 3.

Scientific Grants

Research projects (Principal Investigator)

- 2022-2023 **University of Pisa research projects**,
Project title: Advanced modelling of ultra-lightweight materials and structures;
Research fundings: 23.787€.
- 2019 **Young researcher projects grants GNFM (Gruppo Nazionale per la Fisica Matematica)**,
Project title: Modellazione Variazionale di Fenomeni di Fatica in Elastomeri;
Research fundings: 2700€, <http://www.altamatematica.it/gnfm/>.
- 2016 **Research project MATHTECH (CNR-INDAM)**,
Project title: Modelli variazionali di danno non locale e plasticità per la descrizione della frattura duttile e coesiva, <http://www.altamatematica.it/it/node/486>.
- 2015 **Young researcher projects grants GNFM (Gruppo Nazionale per la Fisica Matematica)**,
Project title: Modellazione variazionale della risposta meccanica di elementi strutturali a supporto monodimensionale con danno e plasticità;
Research fundings: 1500€, <http://www.altamatematica.it/gnfm/>.

- 2014 **DAAD project**,
Project title: Variational modeling of shape memory alloys and the issue of localizations,
 International research project grant of DAAD (Deutscher Akademischer Austauschdienst)
 spent at Institute of Applied Mechanics, Universität Stuttgart, Germania.
- 2014 **Avvio alla Ricerca - Sapienza**,
Project title: Materiali Compositi Innovativi per Applicazioni Civili;
Research starting grants of SAPIENZA University of Rome;
Research fundings: 2000€, <http://www.uniroma1.it/ricerca/finanziamenti/bandi-di-ateneo>.
- [Research projects \(Investigator\)](#)
- 2023-2025 **PRIN 2022 (Pisa research unit)**,
Progetto: NUMerical modelling and optimisation of SHELL Structures Against Fracture and Fatigue with Experimental Validations (NutShell);
Research fundings: ~ 107.000€, by Ministry of University and Research.
- 2020-2021 **University of Pisa research projects**,
Project title: Resilience of small historical urban centers and transportation networks;
Research fundings: ~ 36.000€.
- 2019-2021 **PRIN 2017 (Pisa research unit)**,
Project title: Integrated mechanobiology approaches for a precise medicine in cancer treatment;
Research fundings: ~ 150.000€, by Ministry of University and Research.
- 2017 **Progetti Giovani GNFM (Gruppo Nazionale per la Fisica Matematica)**,
Project title: Guscio Nematici Sferici;
Research fundings: 2000€, <http://www.altamatematica.it/gnfm/>.
- 2016 **MIUR-DAAD Joint Mobility Program (participant)**, *Project title: Variational approach to fatigue phenomena with phase-field models: modeling, numerics and experiments*"; *Fundings for mobility (37000€)*, <http://www.studigermanici.it/le-iniziativa/617-bando-miur-daad-joint-mobility-program>.
- 2015 **PI for Young researcher projects grants, GNFM (Gruppo Nazionale per la Fisica Matematica)**, *Research fundings: 1500€*, <http://www.altamatematica.it/gnfm/>.
- 2014 **DAAD Scholarship**, *One month fundings for a short research stay in Germany by DAAD (Deutscher Akademischer Austauschdienst)*, <https://www.daad.de/en/>.
- 2014 **Participant to Young researcher projects grants, GNFM (Gruppo Nazionale per la Fisica Matematica)**, *Research fundings: 2000€*, <http://www.altamatematica.it/gnfm/>.
- 2014 **Research starting grants, SAPIENZA-University of Rome**, amount: 2000€, <http://www.uniroma1.it/ricerca/finanziamenti/bandi-di-ateneo>.
- 2010-2013 **Vinci program (mobility fundings for "cotutelle" PhD thesis)**,
 Università Italo-Francese grants (<http://www.universite-franco-italienne.org/>), amount 4500€.
- 2012 **Mobility support grants**,
 Ambasciata di Francia in Italia, <http://www.ambafrance-it.org/>.
- 2009 **Participant to Young researcher projects grants, GNFM (Gruppo Nazionale per la Fisica Matematica)**, amount: 1500€, <http://www.altamatematica.it/gnfm/>.