Gabriele Albertini

Cornell University
Hollister Hall, 253
Ithaca, NY 14853

+1(607)216-5502
ga288@cornell.edu

albertini-research.com
GoogleScholar

Education

Cornell University

8/2016 – 5/2021 Doctor of Philosophy in Structural Engineering with minors in Computational Science and Engineering, and Solid Mechanics

École Polytechnique Fédérale de Lausanne – EPFL (Switzerland)

9/2014 – 6/2016 Master of Science in Civil Engineering

9/2011 – 6/2014 Bachelor of Science in Civil Engineering

University of New South Wales – UNSW Sydney (Australia)

8/2013 – 8/2014 Undergraduate Exchange Program

Research Experience

Cornell University

1/2016 – 5/2021 **Doctoral Researcher Assistant**, Advisor: Prof. David S. Kammer
Numerical and theoretical study of dynamic fracture of heterogeneous materials. Using 3D simulations demonstrated that experimentally observed slip fronts at frictional interfaces can be described by dynamic fracture mechanics, independently of their propagation speed. Numerical study of dynamic ruptures at frictional interfaces within a heterogeneous solid revealed that reflected waves lead to abrupt changes of rupture speed.

Eidgenössische Technische Hochschule – ETH Zürich (Switzerland)

9/2019 – 5/2021 **Visiting Researcher** with Prof. David S. Kammer
Theoretical and numerical study of nucleation of slip fronts at frictional interfaces with random strength profiles showed that the effective strength increases with smaller correlation length.

Sorbonne Université (France)

9/2018 – 1/2019 **Visiting Researcher** with Dr. Laurent Ponson at Institut Jean le Rond d'Alembert
Experimental study of dynamic fracture of heterogeneous materials. Specimen are made of multi-material 3D-printed polymers. Crack dynamics are studied based on displacement fields measurements, acquired by Digital Image Correlation using high-speed photography. Revealed that cracks instantaneously adapt their speed when facing a fracture energy heterogeneity, which leads to toughening.

École Polytechnique Fédérale de Lausanne – EPFL

9/2014 – 1/2015 **Master Student Researcher** with Prof. Christian Louter
Experimental study of ultimate flexural strength of post-tensioned steel reinforced glass beams.

Research Interests

Solid Mechanics, Fracture Mechanics, Friction, Mechanics and Physics of Earthquakes, Mechanical Metamaterials, Heterogeneous Media, Nonlinear Physics, Non-equilibrium Statistical Mechanics, Scientific Computing, High Performance Computing

Publications

Refereed Journals

6 Schär, S., Albertini, G. and Kammer, D. S., 2020., "Nucleation of frictional sliding by coalescence of microslip", ***under review***. arXiv:2010.04343 [cond-mat.soft]

5 Albertini, G., Lebihain, M., Hild, F. Ponson, L. and Kammer, D.S., 2020. "Effective toughness of periodic heterogeneous materials: the role of rate-dependent fracture energy", ***under review***. arXiv:2003.13805 [cond-mat.soft]

4 Albertini, G., Karrer, S., Grigoriu, M. D. and Kammer, D. S., 2020., "Stochastic Properties of Static Friction", **Journal of the Mechanics and Physics of Solids, *in press***. arXiv:2005.06113 [cond-mat.soft]

3 Svetlizky, I.*, Albertini, G.*, Cohen, G., Kammer, D.S. and Fineberg, J., 2020. "Dynamic fields at the tip of sub-Rayleigh and supershear frictional rupture fronts", **Journal of the Mechanics and Physics of Solids** 137, 103826. https://doi.org/10.1016/j.jmps.2019.103826
*Equally contributing first authors

2 Ma, X., Hajarolasvadi, S., Albertini, G., Kammer, D.S., Elbanna, A.E., 2019. "A hybrid finite element-spectral boundary integral approach: Applications to dynamic rupture modeling in unbounded domains", **International Journal for Numerical and Analytical Methods in Geomechanics** 43, 1, 317-338. https://doi.org/10.1002/nag.2865

1 Albertini, G., Kammer, D.S., 2017. "Off-fault heterogeneities promote supershear transition of dynamic mode II cracks", **Journal of Geophysical Research: Solid Earth** 122, 2017JB014301. https://doi.org/10.1002/2017JB014301

Work in Progress

3 Albertini, G., Ke, C.Y., G. McLaskey and Kammer, D.S., "Fracture properties of laboratory-generated earthquakes", **under preparation**.

2 Albertini, G., Elbanna, A. and Kammer, D.S., "A Three Dimensional Hybrid Finite Element-Spectral Boundary Integral Approach: Applications to Dynamic Earthquake Rupture Modeling in unbounded domains", **under preparation**.

1 Kammer, D.S., Albertini, G. and Ke, C.Y., "UGUCA: a spectral-boundary-integral method for modeling fracture and friction", **under preparation**.

Presentations at Conferences and Workshops

(presenter underlined)

2020 Albertini, G., Lebihain, M., Hild, F. Ponson, L. and Kammer, D.S., "Effective toughness of heterogeneous materials with rate-dependent fracture energy". *Society of Engineering Science (SES) 57th Annual Technical Meeting.* September 29 - October 1, 2020, virtual meeting.

2019 Albertini, G., Lebihain, M., Hild, F. Ponson, L. and Kammer, D.S., "Effective toughness of periodic heterogeneous materials: the role of rate-dependent fracture energy". *Society of Engineering Science (SES) 56th Annual Technical Meeting.* October 13-15, 2019, St. Louis, Missouri.

2018 Albertini, G. and Kammer, D.S., "Properties of Three Dimensional Supershear Mode II Ruptures", *Workshop: MEchanics and Physics of STrechable Objects (MEPHiSTO).* August 7-17, 2018, Cargese, France.

2018 Albertini, G. and Kammer, D.S., "Properties of Three Dimensional Supershear Mode II Ruptures", *18th U.S. National Congress for Theoretical and Applied Mechanics (USNCTAM).* June 4-9, 2018, Chicago, Illinois.

2017 Albertini, G. and Kammer, D.S., "Propagation Speed Instability in Rapid Mode II Fracture in Heterogeneous Media", *Society of Engineering Science (SES) 54th Annual Technical Meeting.* July 25-28, 2017, Boston, Massachusetts.

2016 Albertini, G. and Kammer, D.S., "Supershear transition of dynamic mode II fracture in heterogeneous elastic media", *Society of Engineering Science (SES) 53rd Annual Technical Meeting.* October 2-5, 2016, College Park, Maryland.

Mentoring

Master Theses (co-supervised with Prof. David S. Kammer)

Spring 2017 Thibault Roch, Civil Engineering, Cornell University

Semester Projects (co-supervised with Prof. David S. Kammer)

Spring 2020 Styfen Schär, Civil Engineering, ETH Zürich

Fall 2019 Simon Karrer, Civil Engineering, ETH Zürich

Teaching Experience

Cornell University

Fall 2020 Geotechnical Engineering for Energy, Environment and Civil Infrastructure (CEE 3410) – Teaching Assistant (TA) (37 students)
Designed and executed laboratory demonstrations. Homework and exam preparation and grading.

Spring 2020 Introduction to the Behavior of Steel Structures (CEE 4740) – TA (30 students)
Designed in-class activities and homework.

Spring 2019 Differential Equations for Engineers (MATH 2930) – TA (61 students)
Taught weekly discussion section and designed worksheets and in-class activities.

Spring 2018 Differential Equations for Engineers (MATH 2930) – TA (101 students)
Taught weekly discussion section and designed worksheets and in-class activities.

École Polytechnique Fédérale de Lausanne – EPFL

Fall 2015	Geothechincs and Rock Mechanics (Master) – TA Taught weekly discussion section
Spring 2013	Mathematics and Geometry (Undergraduate) – TA Taught weekly discussion section
Spring 2012	Mathematics and Geometry (Undergraduate) – TA Taught weekly discussion section

Industry Experience

Summer 2015	Engineer Intern at AF-Consult Switzerland AG. Project: Nant de Drance Pumped Storage Power Plant. Local site management.
Summer 2014	Engineer Intern at Repower AG. Project: Renovation of Silvaplana Hydro Power Plant. Feasibility Study.

Awards

2018 3rd Place for Oral Presentation. Tenth Annual Civil and Environmental Engineering Graduate Research Symposium. Cornell University.

2017 2nd Place for Oral Presentation. 9th Annual Civil and Environmental Engineering Graduate Research Symposium. Cornell University.

University Service

2017 – 2018 Treasurer of the Civil and Environmental Engineering Graduate Student Association (CEE GSA), Cornell University. Managed the yearly budged dedicated to events and activities organized by the CEE GSA, including the Graduate Student Research Symposium and academic talks by professors of the CEE department and invited speakers.

Languages

Italian (native), English (fluent), French (fluent) & German (fluent)

Technical Skills

Programming

Python, Matlab, C, C++, MPI, OpenMP

Numerical Modeling Methods

Finite Element Method, Spectral Boundary Integral Method, Cohesive Element Model for Fracture

Experimental Methods

Experimental Fracture Mechanics, Integrated Digital Image Correlation, Signal Processing

Last updated: November 15, 2020