Behrooz Ferdowsi, Ph. D. (Dr. sc. ETH Zurich)

behrooz@princeton.edu
http://princeton.edu/behroozf
http://behroozf.github.io
Google scholar, ResearchGate, ORCID iD

Last updated: May 27, 2019

Address

Dr. Behrooz Ferdowsi
Hess Fellow and Postdoctoral Research Associate
Department of Geosciences, Princeton University
Princeton, NJ 08544, USA

Research interests

- Rock friction, fault mechanics, physics of the seismic cycle, orogenic deformation
- Earth and planetary surface dynamics, sediment transport, geophysical landscape evolution
- Granular physics and soft condensed matter physics for geosciences broadly
- Computational, experimental and theoretical studies of amorphous and disordered Earth materials
- Continuum modeling of Earth and planetary subsurface processes, surface - subsurface interactions

Academic appointments

2017-present Harry H. Hess Postdoctoral Fellow
Department of Geosciences, Princeton University
Advisor: Professor Allan M. Rubin

2015[1]-2017 Postdoctoral researcher, and NCED Synthesis Postdoctoral Fellow
Department of Earth and Environmental Science, University of Pennsylvania
joint with the National Center for Earth-surface Dynamics, University of Minnesota
Advisor: Professor Douglas J. Jerolmack
NCED co-advisor: Professor Chris Paola

2011-2014 Graduate Student and Research Assistant
Department of Civil, Environmental and Geomatic Engineering, ETH Zurich, Switzerland
Advisor: Dr. Michele Griffa

2010-2011 Visiting Student, Research and Teaching Assistant
Institute for Infrastructure and Environment, University of Edinburgh, Scotland, UK
Host faculty: Professor Jin Ooi

Education

2011-2014 Ph.D. (Dr. sc.), Civil and Environmental Engineering, ETH Zurich, Switzerland
2007-2010 M.Sc., Geological Engineering, Tehran Polytechnic, Iran
2003-2007 B.Sc., Civil Engineering, University of Guilan, Iran

[1] I started my postdoctoral research at the University of Pennsylvania with 8 months delay due to US visa restrictions for Iranian nationals. That is the reason for the gap between years 2014 and 2015 in my CV. The original start date for my postdoctoral work at the University of Pennsylvania was June 1, 2014. I started at UPenn on February 1, 2015. I spent some longer time in Switzerland following my PhD defense between June and November 2014, moved to Canada in October 2014 and waited there until my US visa was issued on December 16, 2014.

Honors and awards

- Harry H. Hess Postdoctoral Fellowship, Princeton University (2017)
- Nominated for ETH medal (ETH-Medaille) (2014)
- Award for best contribution, The 18^{th} International Conference on Nonlinear Elasticity in Materials, Ascona (Centro Stefano Franscini of ETH Zurich) in Switzerland, June 9-14, 2013. CSF Awards 2013; photo
- Scholarship from Deutsche Forschungsgemeinschaft (DFG) for attending the 17th Fall Seminar on Nonlinear Dynamics at the University of Bayreuth, October 7-10, 2012
- Scholarship for attending the Les Houches (France) winter school on Materials Deformation: Fluctuations, Scaling, Predictability, 22-27 January 2012
- Swiss National Science Foundation (SNSF) fellowship for PhD studies at ETH Zürich (2011-2014)
- 3 years fellowship for PhD studies at the University of Edinburgh (Marie Curie (EU) fellowship) (2010-2013) - Declined
- 4 years fellowship for PhD studies at the University of Minnesota (2010-)
- 4 years fellowship for PhD studies at the University of Southern California (2010-2014) - Declined

---

Articles in review and revision

- B. Ferdowsi, J. D. Gartner, K. N. Johnson, A. Kasprak, A. B. Limaye, K. L. Miller, W. Nardin, A. C. Ortiz, M. Perignon, A. Tejedor
  (review paper, all equal contribution)
  Earthcasting: applied geomorphic predictions
  (in revision, after review) at Earth's Future

Peer-reviewed articles

10. B. Ferdowsi, C. P. Ortiz, D. J. Jerolmack
    Glassy dynamics of landscape evolution
    Proceedings of the National Academy of Sciences of the USA, 115 (19), pp. 4827-4832, 2018.

9. B. Ferdowsi, C. P. Ortiz, M. Houssais, D. J. Jerolmack
   River-bed armouring as a granular segregation phenomenon
   Nature Communications, 8 (1363), 2017.
   Highlighted in Penn News, Phys.org, EurekAlert!, Science Newsline, Environmental News Network, Article in Penn News → 'Brazil Nut Effect' Helps Explain How Rivers Resist Erosion, Penn Team Finds

8. B. Ferdowsi, M. Griffa, R. A. Guyer, P. A. Johnson, C. Marone and J. Carmeliet
   Acoustically-induced slip in sheared granular layers: application to dynamic earthquake triggering
   Geophysical Research Letters, 42 (22), pp. 9750-9757, 2015.

7. B. Ferdowsi, M. Griffa, R. A. Guyer, P. A. Johnson, C. Marone and J. Carmeliet
   3D Discrete Element Modeling of triggered slip in sheared granular media
   Physical Review E, 89 (4), pp. 042204(1-12), 2014.

6. B. Ferdowsi, M. Griffa, R. A. Guyer, P. A. Johnson, and J. Carmeliet
   Effect of boundary vibration on the frictional behavior of a dense sheared granular layer
   Acta Mechanica, 225 (8), pp. 2227-2237, 2014.

5. P. A. Johnson, B. Ferdowsi, B. Kaproth, M. M. Scuderi, M. Griffa, J. Carmeliet, R. A. Guyer, P.-Y. Le Bas, D. T. Trugman, and C. Marone
   Acceleration of acoustical emission precursors preceding failure in sheared granular material

Geophysical Research Letters, 40 (21), pp. 5627-5631, 2013.

4. B. Ferdowsi, M. Griffa, R.A. Guyer, P.A. Johnson, C. Marone and J. Carmeliet
Microslips as precursors of large slip events in the stick-slip dynamics of sheared granular layers: a discrete element model analysis
Geophysical Research Letters, 40 (16), pp. 4194-4198, 2013.

3. M. Griffa, B. Ferdowsi, E. G. Daub, R. A. Guyer, P. A. Johnson, C. Marone and J. Carmeliet
Influence of vibration amplitude on dynamic triggering of slip in sheared granular layers
Physical Review E, 87 (1), pp. 012205(1-12), 2013.

2. M. Griffa, B. Ferdowsi, E. G. Daub, R. A. Guyer, P. A. Johnson, C. Marone and J. Carmeliet
Meso-mechanical analysis of deformation characteristics for dynamically triggered slip in a granular medium
Philosophical Magazine, 92 (28-30), 2012.

1. A. Soroush and B. Ferdowsi
Three dimensional discrete element modeling of cyclic undrained behavior of granular media: a micromechanical perspective
Powder Technology, 212 (1), pp. 1-16 , 2011.

Manuscripts in preparation

— B. Ferdowsi, A. M. Rubin
A granular physics-based view of fault rock friction
In preparation for Journal of Geophysical Research - Solid Earth

— E. J. Harrison, B. Ferdowsi, J. Willenbring
Soil transport and creep across environments
In preparation

— B. Ferdowsi, B. C. Jones, J. L. Stein, T. Shinbrot
Pattern formation in perturbed granular layers
In preparation

Research fundings

— United States Geological Survey (USGS), Earthquake Hazards Program: "How much of rate-and-state friction can be explained by models of granular flow?"; PI: Prof. Allan M. Rubin (Department of Geosciences, Princeton University); Behrooz Ferdowsi wrote first draft (2019, $100,000, in review)

— National Science Foundation (NSF), Geophysics Program: "Collaborative Research: The Physics of Rock Friction at Low Slip Rates"; PI: Prof. Allan M. Rubin (Department of Geosciences, Princeton University); Behrooz Ferdowsi contributed to writing (2019, $203,333, in review)

— United States Geological Survey (USGS), Earthquake Hazards Program: "How much of rate-and-state friction can be explained by granular friction models?"; PI: Prof. Allan M. Rubin (Department of Geosciences, Princeton University); Behrooz Ferdowsi wrote first draft (2018, $99,816, approved)

— Southern California Earthquake Center (SCEC), Science Collaboration Grant: "Physical controls of spontaneous and triggered slow-slip and stick-slip at the fault gouge scale"; PI: Prof. David L. Goldsby (Department of Earth and Environmental Sciences, University of Pennsylvania); Behrooz Ferdowsi wrote first draft (2016, $25,300, approved)

Invited talks, presentations, and posters

— May 2019, Princeton, NJ, USA - Science Beyond Guyot: 25 Years of Hess Fellows - A Symposium During Reunion, Department of Geosciences, Princeton University. *"Frictional Rheology of Rocks"* (Contributed Talk to the Symposium)

— April 2019, New York, NY, USA - The Benjamin Levich Institute For Physico-Chemical Hydrodynamics, City College of New York. *"How Much of Rate- and State-Dependent Frictional Behavior of Rocks Can Be Explained by Granular Friction?"* (Invited Institutional Seminar)

— February 2019, Atlanta, Georgia, USA - School of Earth and Atmospheric Sciences, Georgia Institute of Technology. *"Granular Physics of Rock Friction at Low Slip Rates"* (Invited Departmental Seminar)

— February 2019, College Station, Texas, USA - Department of Geology and Geophysics, College of Geosciences, Texas A&M University. *"Using Granular Physics to Explain and Model Frictional Behavior of Rocks and Disordered Earth Materials"* (Invited Departmental Seminar)

— January 2019, Princeton, NJ, USA - Transport In Disordered Environments Conference, PCTS Princeton Center for Theoretical Sciences, Princeton University. *"Soil Production and Transport in Natural (Disordered) Environments: Insights from Granular Physics, Geomorphology, and Quaternary Geochronology"* (poster)

— January 2019, San Diego, California, USA - Soil Science Society of America Annual Meeting - "Soils Across Latitudes". *"Soil Production from Above and below: A Unification Theory from a Granular Physics Perspective"* (Invited Talk by Professor Jane Willenbring)

— December 2018, Princeton, New Jersey, USA - Soft Materials Coffee Hour (SMatCH) Meeting, Princeton University. *"Granular physics of earthquake fault friction and nucleation processes"* (Invited Talk)

— December 2018, Washington DC, USA - American Geophysical Union Fall Meeting. *"Granular physics of soil production and creep"* (Invited Talk by Emma Harrison)

— October 2018, Pasadena, California, USA - Workshop on Modeling Earthquake Source Processes, Seismological Laboratory, California Institute of Technology. *"Granular physics of earthquake fault friction and nucleation processes"* (Poster)

— October 2018, Palisades, New York, USA - Lamont-Doherty Earth Observatory, Columbia University. *Geodynamics Seminar "How Much of Rate- and State-Dependent Friction Can Be Explained by Time-Independent Granular Friction Models?"* (Invited Talk)

— August 2018, Andover, New Hampshire, USA - 2018 Rock Deformation Gordon Research Conference, Proctor Academy. *"How Much of Rate- and State-Dependent Friction Can Be Explained by Time-Independent Granular Friction Models?"* (Invited Talk)

— August 2018, Potsdam, Germany. Helmholtz Centre Potsdam, GFZ German Research Centre for Geosciences (Invited job talk at GFZ Earth Surface Process Modelling group, delivered with video-conferencing because of US Travel Ban on my current nationality.)

— July 2018, Amherst, Massachusetts, USA - 3rd Annual Soft Matter Day, Physics Department at University of Massachusetts Amherst. *"Soft Matter Physics of Real Landscapes: Complex Spatiotemporal Behavior of Hillslopes, Rivers, and Earthquake Fault Zones"* (Invited Talk)

— July 2018, Princeton, New Jersey, USA - A two day symposium titled "Geosciences: A broad perspective from Academia and the Industry" at the Department of Geosciences, Princeton University. *"Modeling Earth's surface and subsurface processes across scales: from grains and asperities to geological spatiotemporal scales"* (Poster)

— June 2018, Bristol, United Kingdom - Conference on Unifying Concepts in Glass Physics VII. *"Glassy dynamics*

of landscape evolution" (Invited Talk by Prof. Douglas Jerolmack)

— May 2018, Boulder, Colorado, USA - CSDMS Annual Meeting at the University of Colorado Boulder. *"Glassy dynamics of landscape evolution"* (Poster)

— April 2018, Boulder, Colorado, USA - Coupling of Tectonic and Surface Processes (a CIG-CSDMS workshop) at the University of Colorado Boulder. *"Glassy dynamics of landscape evolution"* (Poster)

— April 2018, Pittsburgh, Pennsylvania, USA - Carnegie Mellon University. *"Mechanics of Amorphous and Granular Materials for Environmental and Geolog/Geophysical Processes"* (Invited Departmental Seminar)

— March 2018, Durham, North Carolina, USA - Duke University. *"Connecting grain to riverbed to watershed scales: granular and statistical physics of subsurface-surface-water interactions"* (Invited Departmental Seminar)

— December 2017, New Orleans, USA - American Geophysical Union Fall Meeting. *"Toward a physics-based rate and state friction law for earthquake nucleation processes in fault zones with granular gouge"* (Talk)

— December 2017, New Orleans, USA - American Geophysical Union Fall Meeting. *"A Physical Interpretation of Hillslope Soil Creep as Deformation of an Amorphous Solid"* (talk by Prof. Douglas Jerolmack)

— November 2017, Denver, USA - Annual Meeting of the American Physical Society Division of Fluid Dynamics. *"Formation and life of a granular cyclone"* (Talk, Galley of Fluid Motion video submission)

— May 2017, State College, USA - Department of Geosciences, Pennsylvania State University. *"Creepy landscapes: the granular origins and slow dynamics of soil transport on hillslopes"* (Poster)

— March 2017, Princeton, USA - Department of Geosciences, Princeton University. *"A unifying framework for slow and fast dynamics deformation and transport in Earth systems"* (Invited Talk)

— December 2016, San Francisco, USA - American Geophysical Union Fall Meeting. *"Creepy landscapes: the granular origins of soil transport on hillslopes"* (Talk)

— December 2016, San Francisco, USA - American Geophysical Union Fall Meeting. *"Nature of transition from jamming to creep and dense flow in granular heaps"* (Poster)

— December 2016, San Francisco, USA - American Geophysical Union Fall Meeting. *"Insights on landscape dynamics from tiny spheres in oil, or: How I learned to stop worrying and love the lab"* (Talk by Prof. Douglas Jerolmack)

— September 2016, Palm Springs (CA), USA - Southern California Earthquake Center (SCEC) Annual Meeting. *"Physical controls of spontaneous and triggered slow-slip and stick-slip at the fault gouge scale"* (Poster)

— July 2016, Stonehill College, Easton (MA), USA - Gordon Research Conference and Seminar: Particulate Systems in Science and Technology. *"Granular segregation in an experimental river"* (GRC Poster, GRS Talk)

— June 2016, Université Pierre-et-Marie-Curie, Paris, France - 31st edition of the Conference on Mathematical Geophysics (CMG). *"Creepy landscapes: the origins and consequences of sub-threshold transport"* (Invited Talk by Prof. Douglas Jerolmack)

— May 2016, USGS National Center, Reston (VA), USA - 2016 River & Regolith Erosion and Deposition Summit: Soil to Sea Meeting. *"Creepy landscapes: the granular origins of soil transport on hillslopes"* (Presentation)

— December 2015, San Francisco, USA - American Geophysical Union Fall Meeting. *"Granular controls of hillslope deformation and creep"* (Poster)

— December 2015, San Francisco, USA - American Geophysical Union Fall Meeting. *"From surface to subsurface and back again: the contribution of subsurface particle motion to surface armoring"* (Invited Talk)

— December 2015, San Francisco, USA - American Geophysical Union Fall Meeting. *"Controls on Dune Deformation Patterns in White Sands, New Mexico"* (Poster by Dylan Lee, Ph.D. student at PennSeD)

— September 2015, Palm Springs (CA), USA - Southern California Earthquake Center (SCEC) Annual Meeting. *"The granular origins of rate and state friction behavior of fault gouge"* (Poster)

— June 2015, Clark University, Worcester (MA), USA - 13th Annual Northeastern Granular Materials Workshop. *"Segregation dynamics in fluid-driven annular Couette flow: contribution of subsurface processes to surface armoring in an idealized riverbed"* (Poster)

— May 2015, University of Delaware, USA - 2015 River & Regolith Erosion and Deposition Summit: Amtrak Soil to Sea Meeting. *"From surface to subsurface and back again: the contribution of subsurface particle motion to surface armoring"* (Poster)

— May 2014, Université du Maine (Group of acoustics and mechanics of materials, Lead by Dr. Vincent Tournat), France. *"Ascoustically-induced unjamming and slip triggering in sheared granular layers"* (Talk by Behrooz)

— November 2013, Yale University (School of Engineering and Applied Science, The O'Hern group), USA. *"DEM modeling of slip triggering in a sheared granular layer"* (Talk by Behrooz)

— November 2013, Pennsylvania State University (Department of Geosciences), USA. Dynamic Triggering of Earthquakes, a seminar organized by Dr. P. A. Johnson (LANL) and Prof. C. Marone (Penn State). *"DEM of a sheared beadpack"* (Talk by Behrooz)

— June 2013, Ascona, Switzerland - The 18^{th} International Conference of Nonlinear Elasticity of Materials. *"MD simulation of slip triggering in sheared granular layers by boundary vibration"* (Talk by Behrooz)

— February 2013, Les Houches, France - The 2^{nd} winter school on "Materials Deformation: Fluctuations, Scaling, Predictability. *"3D MD modeling of slip triggering in sheared granular layers by means of boundary vibration"* (Poster by Behrooz)

Selected service

— Reviewer for:

National Science Foundation (USA) - Geomorphology and Land-use Dynamics,
Army Research Office, U.S. Army Research Laboratory,
U.S.-Israel Binational Science Foundation,
Nature Geoscience, Physical Review Letters, Earth and Planetary Science Letters,
Journal of Geophysical Research - Earth Surface, Journal of Geophysical Research - Solid Earth
Geophysical Research Letters, Computers & Geosciences, Entropy, CATENA
Tribology Letters, International Journal of Solids and Structures,
Scientific Reports, Powder Technology

— Lecturer for the 3rd Annual Soft Matter Day, Department of Physics,
University of Massachusetts at Amherst (2018)

— Organizer of the Solid Earth Brownbag seminars at Princeton Geosciences together with one of my postdoctoral colleagues in the department (2017-2019)

— Lecturer and instructor for the Summer Institute for Earth-surface Dynamics, NCED2,

University of Minnesota (years 2015, 2016)

- Outstanding Student Paper Award (OSPA) Judge for American Geophysical Union Annual Meeting (2017, 2018)

Professional affiliations

- Regular member, Earth Science Women's Network, 2019-present
- Regular member, American Physical Society (APS), 2017-present
- Regular member, Southern California Earthquake Center (SCEC), 2015-present
- Regular member, American Geophysical Union (AGU), 2015-present
- Synthesis postdoctoral fellow, National Center for Earth-surface Dynamics, 2015-present
- Regular member, Swiss Geological Society, 2013-2015

References

Available upon request.