CV of Shiqing Xu

National Research Institute for Earth Science and Disaster Resilience
Earthquake and Tsunami Disaster Prevention Research Department
3-1 Tennodai, Tsukuba, Ibaraki 305-0006, Japan
Phone: +81-29-863-7693
Fax: +81-29-863-7610
Email: shiqing@bosai.go.jp
Website: https://sites.google.com/site/stillerxu/

EDUCATION

- University of Southern California, Los Angeles, California, USA, 2007 – 2013
  Ph.D. in Geophysics, under the supervision of Prof. Yehuda Ben-Zion
  Dissertation Title: "*Interaction between dynamic ruptures and off-fault yielding characterized by different rheologies*"
- Peking University, Beijing, P. R. China, 2003 – 2007
  B.S. in Geophysics (Major) and Mathematics & Applied Mathematics (Minor)

RESEARCH EXPERIENCE

- Research Fellow at National Research Institute for Earth Science and Disaster Resilience, Tsukuba, Ibaraki, Japan, 2013 – present
- Research Assistant at University of Southern California, Los Angeles, California, USA, 2007 – 2013
- Field trip to the San Andreas Fault and San Jacinto Fault in California, USA, 2007 – 2012

TEACHING EXPERIENCE

Teaching Assistant at University of Southern California

- GEOL 240 *Earthquakes*: Fall 2007, Fall 2008, Fall 2009, Spring 2011, Fall 2012
- CORE 103 *The Process of Change in Science*: Spring 2009, Spring 2010

RESEARCH INTERESTS

Earthquake Physics

- Dynamics of earthquake ruptures and off-fault damage
- Rock mechanics and damage rheology
- Seismological and geological signals indicative of rupture properties

Fault Zone Seismology

- Analysis of trapped and head waves for fault zone properties
- Active-source field experiments across fault zones

Numerical Modeling

- Finite Difference Method
- Finite Element Method
- Spectral Element Method

Laboratory Experiments

- Joint observation of nucleation and propagation of dynamic ruptures in the lab
- Analysis of acoustic signals for monitoring rock elastic properties
- Rock frictional behavior under slow-to-fast slip rate, low-to-high normal stress

FELLOWSHIPS AND HONORS

- Chinese Academy of Science Scholarship in Geophysics, 2nd Prize, 2006
- Tsang Hin Chi Scholarship, Peking University, 2003 – 2006
- Award for Study Excellence, Peking University, 2004
- National Scholarship, 2003

PROFESSIONAL SOCIETIES AND SERVICES

Member of

- American Geophysical Union, 2008 – present
- Seismological Society of America, 2012 – present
- Seismological Society of Japan, 2013 – present
- Japan Geoscience Union, 2014 – present
- Southern California Earthquake Center, 2007 – 2013

Reviewer for

- AGU: Geophysical Monograph Series, Journal of Geophysical Research, Geophysical Research Letters
- Bulletin of the Seismological Society of America
- Earthquake Science
- Geophysical Journal International
- Natural Hazards
- NSF proposal (2015, 2016)
- Pure and Applied Geophysics

Meeting service

- Primary session convener for T13E in AGU Fall Meeting 2014 – Insights on Fault Motion and Its Relation to Fault Properties and Loading Conditions: From the Lab to the Field
- Primary session convener for S11E in AGU Fall Meeting 2016 – Physics of Earthquake Rupture Propagation

SKILLS

Windows, Mac, Unix/Linux; MS Office, LaTeX, Adobe Illustrator; MATLAB, Mathematica, C, Fortran; numerical skills in finite difference, finite element and spectral element; experimental skills in operating direct shear and rotary shear apparatuses

PUBLICATIONS

Peer-reviewed

Fukuyama, E., K. Tsuchida, H. Kawakata, F. Yamashita, K. Mizoguchi, and **S. Xu** (2017), Spatiotemporal complexity of 2-D rupture nucleation process observed by direct monitoring during large-scale biaxial rock friction experiments, *Tectonophysics* – Special Issue "Physics of Earthquake Rupture Propagation", doi:10.1016/j.tecto.2017.12.023.

Xu, S., E. Fukuyama, F. Yamashita, K. Mizoguchi, S. Takizawa, and H. Kawakata (2017), Strain rate effect on fault slip and rupture evolution: Insight from meter-scale rock friction experiments, *Tectonophysics* – Special Issue "Physics of Earthquake Rupture Propagation", doi:10.1016/j.tecto.2017.11.039.

Aldam, M., **S. Xu**, E.A. Brener, Y. Ben-Zion, and E. Bouchbinder (2017), Non-monotonicity of the frictional bimaterial effect, *Journal of Geophysical Research*, 122(10), 8270–8284, doi:10.1002/2017JB014665.

Xu, S., and Y. Ben-Zion (2017), Theoretical constraints on dynamic pulverization of fault zone rocks, *Geophysical Journal International*, 209(1), 282–296, doi:10.1093/gji/ggx033.

Xu, S., E. Fukuyama, H. Yue, and J.-P. Ampuero (2016), Simple crack models explain deformation induced by subduction zone megathrust earthquakes, *Bulletin of the Seismological Society of America*, 106(5), 2275–2289, doi:10.1785/0120160079.

Fukuyama, E., **S. Xu**, F. Yamashita, and K. Mizoguchi (2016), Cohesive zone length of metagabbro at supershear rupture velocity, *Journal of Seismology* (Special Issue: Imaging Earthquakes and Earth Structure Through Waves), 20(4), 1207–1215, doi:10.1007/s10950-016-9588-2.

Yamashita, F., E. Fukuyama, K. Mizoguchi, S. Takizawa, **S. Xu**, and H. Kawakata (2015), Scale dependence of rock friction at high work rate, *Nature*, 528, 254–257, doi:10.1038/nature16138.

Xu, S., E. Fukuyama, Y. Ben-Zion, and J.-P. Ampuero (2015), Dynamic rupture activation of backthrust fault branching, *Tectonophysics*, 644–645, 161–183, doi: 10.1016/j.tecto.2015.01.011.

Xu, S., Y. Ben-Zion, J.-P. Ampuero, and V. Lyakhovsky (2015), Dynamic ruptures on a frictional interface with off-fault brittle damage: Feedback mechanisms and effects on slip and near-fault motion, *Pure and Applied Geophysics*, 172, 1243–1267, doi: 10.1007/s00024-014-0923-7.

Xu, S., and Y. Ben-Zion (2013), Numerical and theoretical analyses of in-plane dynamic rupture on a frictional interface and off-fault yielding patterns at different scales, *Geophysical Journal International*, 193, 304–320, doi: 10.1093/gji/ggs105.

Xu, S., Y. Ben-Zion, and J.-P. Ampuero (2012b), Properties of inelastic yielding zones generated by in-plane dynamic ruptures: II. Detailed parameter-space study, *Geophysical Journal International*, 191, 1343–1360, doi: 10.1111/j.1365-246X.2012.05685.x.

Xu, S., Y. Ben-Zion, and J.-P. Ampuero (2012a), Properties of inelastic yielding zones generated by in-plane dynamic ruptures: I. Model description and basic results, *Geophysical Journal International*, 191, 1325-1342, doi: 10.1111/j.1365-246X.2012.05679.x.

Ben-Zion, Y., T. Rockwell, Z. Shi, and **S. Xu** (2012), Reversed-polarity secondary deformation structures near fault stepovers, *Journal of Applied Mechanics*, 79(3), 031025, doi:10.1115/1.4006154.

Under review

Yamashita, F., E. Fukuyama, **S. Xu**, K. Mizoguchi, H. Kawakata and S. Takizawa (2018), Rupture preparation process controlled by surface roughening on meter-scale laboratory fault, *Tectonophysics* – Special Issue "Physics of Earthquake Rupture Propagation".

Non-peer-reviewed

Xu, S. (2013), Interaction between dynamic ruptures and off-fault yielding characterized by different rheologies, *Ph.D. thesis*, University of Southern California, Los Angeles, CA.

SELECTED MEETING ABSTRACTS

Oral presentation

- *Towards probing the true frictional properties from off-fault measurements during laboratory earthquakes*, Workshop: Frontiers in Studies of Earthquakes and Faults, Southern University of Science and Technology, Shenzhen, China, November 27 – December 1, 2017.
- *Sequential activation of reverse and normal faulting in the upper plate during the 2011 Tohoku earthquake*, JpGU-AGU Joint Meeting, Chiba-city, Japan, May 20 – 25, 2017.
- *Strain rate effect on rupture nucleation and mainshock propagation speed*, JpGU-AGU Joint Meeting, Chiba-city, Japan, May 20 – 25, 2017.

- *Influence of fault surface heterogeneity on apparent frictional strength, slip mode and rupture mode: insights from meter-scale rock friction experiments*, AGU (American Geophysical Union) Fall Meeting, San Francisco, December 12 – 16, 2016.
- *Revisiting the slip-weakening friction: probe into the true source properties from off-fault measurements*, SSJ (Seismological Society of Japan) Fall Meeting, Nagoya, Japan, October 5 – 7, 2016.
- *Effect of loading rate on the slow slip phase preceding mainshocks: insight from laboratory friction experiments*, Joint Workshop on Slow Earthquakes 2016, Earthquake Research Institute at the University of Tokyo, Tokyo, Japan, September 13 – 15, 2016.
- *Revisiting the slip-weakening friction: probe into the true source properties from off-fault measurements*, JpGU (Japan Geoscience Union) Meeting, Chiba-city, Japan, May 22 – 26, 2016.
- *Brittle asperities and stick-slip motion: insight from friction experiments along a gabbro/marble interface*, SSJ (Seismological Society of Japan) Fall Meeting, Kobe, Japan, October 26 – 28, 2015.
- *Rupture complexity revealed by laboratory friction experiments over meter-scale rocks*, 9th ACES (APEC Cooperation for Earthquake Simulation) International Workshop, Chengdu, China, August 10 – 16, 2015.
- *Evolution of rupture style with total fault displacement: insight from meter-scale direct shear experiments*, Workshop on Numerical Modeling of Earthquake Motions: Waves and Ruptures, Smolenice Castle near Bratislava, Slovakia, July 5 – 9. 2015.
- *Evolution of rupture style with total fault displacement: insight from meter-scale direct shear experiments*, 26th IUGG (International Union of Geodesy and Geophysics) General Assembly, Prague, Czech Republic, June 22 – July 2, 2015.
- *Evolution of rupture style with accumulation of fault displacement during large-scale biaxial friction experiments*, SSJ (Seismological Society of Japan) Fall Meeting, Niigata, Japan, November 24 – 26, 2014.
- *Fault barrier favors activation of backthrusts near segment ends of megathrust ruptures*, AGU (American Geophysical Union) Fall Meeting, San Francisco, December 9 – 13, 2013.

Posters

- *Brittle asperities and stick-slip motion: insight from friction experiments along a gabbro/marble interface*, AGU (American Geophysical Union) Fall Meeting, San Francisco, December 14 – 18, 2015.
- *Laboratory investigation of slip mode along a bimaterial (gabbro/marble) fault interface: preliminary results and implications*, Workshop on Numerical Modeling of Earthquake Motions: Waves and Ruptures, Smolenice Castle near Bratislava, Slovakia, July 5 – 9. 2015.
- *Numerical and theoretical analyses of in-plane dynamic rupture on a frictional interface and off-fault yielding patterns at different scales*, AGU (American Geophysical Union) Fall Meeting, San Francisco, December 3 – 7, 2012.
- *Dynamic in-plane ruptures on a frictional interface with spontaneous generation of off-fault brittle damage*, IUGG (International Union of Geodesy and Geophysics) Conference on Mathematical Geophysics, Edinburgh, June 18 – 22, 2012.
- *Off-fault yielding during dynamic ruptures: distribution and orientation*, Workshop on Earthquake Source Dynamics: Data and Data-constrained Numerical Modeling, Smolenice Castle near Bratislava, Slovakia, June 27 – July 1, 2010.

RECENT INVITED TALKS

- *Influence of fault surface heterogeneity on apparent frictional strength, slip mode and rupture mode: insights from meter-scale rock friction experiments*, China University of Geosciences (Wuhan), December 30, 2016.
- *Improved understanding of the relationship between megathrust earthquakes and off-plate boundary deformation*, University of Tsukuba, August 21, 2015.
- *Evolution of rupture style with total fault displacement: insights from meter-scale direct shear experiments*, University of Vienna, July 3, 2015.
- *Evolution of rupture style with accumulation of fault displacement during large-scale biaxial friction experiments*, University of Science and Technology of China, January 3, 2015.
- *Dynamic modeling of backthrust rupture*, Kyoto University, September 25, 2014.
- *Fault barrier favors activation of backthrusts near segment ends of megathrust ruptures*, Peking University, January 2, 2014.
- *Refined understanding of dynamic ruptures and off-fault yielding patterns, with applications to laboratory experiments and natural earthquakes*, Caltech, March 20, 2013.