

ADAM ZSARNÓCZAY

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ACADEMIC APPOINTMENTS

Postdoctoral Researcher **Stanford University** present
Developing an open-source framework for multi-hazard damage and loss assessment for buildings and infrastructure.
Engaging researchers to create libraries of methods and models for natural hazards engineering.

Visiting Scholar **Stanford University** 2018
Developed a framework of virtual experiments to help improve calibration methods for structural models.

Research Fellow **Budapest University of Technology and Economics (BME)** 2017
Developed new seismic hazard maps and design spectra for Hungary; participated in research on rocking structures.

Assistant Professor **BME** 2015
Designed and taught structural design and experimental analysis courses and advised thesis writing.

Assistant Lecturer **BME** 2014
Taught structural design classes and advised thesis writing for undergraduate students in English and in Hungarian.

EDUCATION

Ph.D. in Civil Engineering, summa cum laude **BME** 2014
thesis: Experimental and Numerical Investigation of BRB frames
for Eurocode Conforming Design Procedure Development
advisor: László Gergely Vigh

M.Sc. in Civil Engineering, with honors **BME** 2010
thesis: Seismic performance assessment of Hungarian girder bridges
advisors: László Gergely Vigh
László P. Kollár

M.Eng. in Civil Engineering, highest honors **University of Tokyo** 2009
thesis: Evaluation of Post-Earthquake Recovery Strategies Considering
the Complexity of Sets of Possible Outcomes
advisors: Riki Honda
Muneo Hori

RESEARCH EXPERIENCE

NSF/NHERI SimCenter – Computational modeling and simulation center **Stanford University**
Postdoctoral Researcher 07/2018 – present

- Lead developer of an open-source framework for multi-hazard damage and loss assessment.
- Member of the development team of a workflow for simulation of regional impact of earthquakes and hurricanes.
- Coedited and wrote part of a report on state-of-the-art in computational simulation in natural hazards engineering.
- Chairing the organizing committee for a workshop on regional recovery simulation.
- Giving webinars and workshop presentations to engage the research community.

principal investigators: **Sanjay Govindjee**, **Gregory G. Deierlein**

funding: National Science Foundation grant #1612843

Investigation of epistemic uncertainty in simulated structural response **Stanford University**
Visiting Scholar 09/2017 – 07/2018

- Quantified how epistemic uncertainty in structural models can lead to significant error in simulated response.
- Demonstrated a component-specific calibration method that reduces errors due to epistemic uncertainty.
- Developed a framework that enables quantitative performance-evaluation for calibration methods.

host/advisor: **Jack W. Baker**

funding: Korányi Imre Fellowship by the Thomas Chalnoky Foundation

Updating the seismic design spectra for Hungary

Budapest University of Technology and Economics (BME)

Research Fellow

01/2016 – 06/2017

- Developed a method that provides a probabilistic description of the site amplification for ground motions.
- Developed seismic hazard maps and site-specific design spectra to serve as basis of seismic building code provisions.
- Prepared part of the documentation and held a one-day educational course for engineers.

funding: Hungarian Chamber of Engineers

principal investigator: **László Gergely Vigh****Seismic performance of structures with rocking mechanisms**

BME

Research Fellow

09/2015 – 08/2017

- Selected hazard-specific sets of ground motion records for laboratory and computational simulations
- Provided expertise in numerical modeling and response simulation of rocking structures.

principal investigator: **László P. Kollár**

funding: Hungarian OTKA/NKFI grant K 115673

All-steel BRB model development in OpenSees

South China Univ. of Technology, Harbin Institute of Technology

Short-term Visiting Researcher

2 months in 2014 and 2016

- Processed raw results of uniaxial cyclic load tests on all-steel buckling restrained braces.
- Developed and calibrated a new model in OpenSees for all-steel BRB components.

hosts/advisors: **Bin Wu, JunXian Zhao**

funding: self-funded

Hazard-consistent ground motion record selection for Europe

University of Porto

Short-term Visiting Researcher

5 months in 2013 – 2014

- Developed an algorithm to describe a site- and structure-specific seismic hazard with a set of Conditional Spectra
- Used the results to define target spectra for ground motion record selection for European sites.

host/advisor: **José Miguel Castro**

funding: three Campus Hungary fellowships in the framework of TÁMOP 4.2.4.B

Development of a Eurocode-conforming design procedure for BRB Frames (BRBF)

BME

Ph.D. Student

09/2010 – 08/2013

- Designed a workflow and used it to evaluate BRBF design procedures using the seismic performance of archetypes.
- Participated in development of the procedure that is expected to be in the revised European building code.

principal investigator: **László Gergely Vigh**

funding: state-funded Ph.D. studies, Star Seismic Europe LLC

Experimental study and numerical modeling of Buckling Restrained Braces (BRBs)

BME

Ph.D. Student

09/2010 – 08/2012

- Participated in the design, execution, and data processing of cyclic tests of 10 BRBs.
- Developed Steel4, a material model in OpenSees, that has since become widely used for BRBs.

principal investigator: **László Gergely Vigh**

funding: state-funded Ph.D. studies, Star Seismic Europe LLC

Seismic performance assessment of Hungarian girder bridges

BME

Graduate Student

09/2009 – 01/2010

- Assembled a database and created archetypes of highway bridges in Hungary.
- Evaluated the performance of each bridge archetype to prioritize seismic retrofits.

advisors: **László Gergely Vigh, László P. Kollár**

funding: state-funded graduate studies

Using complexity of outcomes to evaluate earthquake recovery strategies

University of Tokyo

Graduate Student

09/2008 – 08/2009

- Developed an earthquake-recovery simulation environment to test alternative recovery strategies.
- Showed that limiting the complexity of future decisions reduces the likelihood of unfavorable events.

advisors: **Riki Honda, Muneo Hori**

funding: Monbukagakusho scholarship from the Japanese Government

HONORS AND FELLOWSHIPS

Korányi Imre Fellowship (\$35,000)	2017
Awarded annually to one early-career faculty at BME to support a 10-month research program in a US university.	
Best assistant professor at the Faculty of Civil Engineering of BME: 3rd and 1st place	2014 and 2015
Annually, based on student feedback, 3 early-career faculty (out of 50) are recognized for their teaching	
Three Campus Hungary Fellowships (3 x \$1,000)	2014 and 2015
Each awarded based on a work plan for a short-term study program in a foreign university.	
BMe-Researcher Competition: 2nd prize	2013
Annually 3 students receive it from BME for the scientific impact and online presentation of their research	
Dr. Szittner Antal award	2011
Annually one student receives it for excellent experimental research in the Structural Laboratory of BME	
Diploma award of the Hungarian Chamber of Engineers	2010
Annually one graduating student receives it at the Faculty of Civil Engineering of BME	
Pro Progressio diploma award	2010
Annually one graduating student receives it at the Faculty of Civil Engineering of BME	
Furuichi Kimitake Prize	2009
Annually 10% of students receive it for their excellent thesis at the Dept. of Civil Eng. of the University of Tokyo	
Monbukagakusho Scholarship (\$43,000)	2007
Awarded by the Japanese Government based on recommendation from prominent Japanese universities	
Scholarship of the Hungarian Republic	2006 and 2007
Annually 0.8% of university students receive it who simultaneously excel in studies and extracurricular activities	

MENTORING AND TEACHING EXPERIENCE

Mentoring

J.J. Zou graduate student at Stanford University	May 2019 – present
Ongoing graduate research project under the supervision of Gregory G. Deierlein.	
P. Vargas undergraduate student at University of Michigan	June 2019 – present
10-week NHERI REU program at the SimCenter; subsequent research jointly funded by USGS and SimCenter.	
E. Month undergraduate student at Cornell University	June - August 2019
10-week NHERI REU program at the SimCenter.	

Diploma of 10 graduates and 12 undergraduates at BME 2013 – 2015
The diploma is the final, one-semester long design/research project for undergraduate/graduate studies, respectively.

Teaching	Budapest University of Technology and Economics (BME)	2011 – 2015
graduate courses:	Experimental Analysis of Structures, Seismic Design of Structures	
undergraduate courses:	Bridge Construction, Steel Structures I, Steel Structures II, Steel Buildings, Structural Laboratory Practice	
responsibilities:	Delivered lectures, designed and graded projects, designed and graded exams, held weekly office hours for classes of 20-40 students in English or in Hungarian.	

Student Feedback on Teaching Quality

2013/14 Fall:	5.66 / 6.0	2014/15 Fall:	5.85 / 6.0
2013/14 Spring:	5.72 / 6.0	2014/15 Spring:	5.58 / 6.0

PUBLICATIONS

Peer Reviewed Articles

1. **Zsarnóczyay Á.**, Baker J.W., Using model error in response history analysis to evaluate component calibration methods, *Earthquake Engineering and Structural Dynamics*, pp. 1-19, doi: 10.1002/eqe.3234, 2019
2. Vigh L.G., **Zsarnóczyay Á.**, Balogh T., Eurocode conforming design of BRBF – Part I: Proposal for codification, *Journal of Constructional Steel Research* 135 pp.265-276, doi: 10.1016/j.jcsr.2017.04.010, 2017
3. **Zsarnóczyay Á.**, Vigh L.G., Eurocode conforming design of BRBF – Part II: Design procedure evaluation, *Journal of Constructional Steel Research* 135 pp.253-264, doi: 10.1016/j.jcsr.2017.04.013, 2017
4. **Zsarnóczyay Á.**, Balogh T., Vigh L.G., On the European norms of design of Buckling Restrained Braced Frames, *The Open Civil Engineering Journal*, 11 pp.513-530, doi: 10.2174/1874149501711010513, 2017
5. **Zsarnóczyay Á.**, Vigh L.G., Kollár L.P., Seismic Performance of Conventional Girder Bridges in Moderate Seismic Regions, *Journal of Bridge Engineering* 19:(5) paper 04014001 p.9, doi: 10.1061/(ASCE)BE.1943-5592.0000536, 2014
6. **Zsarnóczyay Á.**, Budaházy V., Vigh L.G., Dunai L., Cyclic hardening criteria in EN 15129 for steel dissipative braces, *Journal of Constructional Steel Research* 83 pp.1-9, doi: 10.1016/j.jcsr.2012.12.013, 2013
7. **Zsarnóczyay Á.**, Vigh L.G., Kollár L.P., Magyarországi közúti gerendahidak szeizmikus viselkedésének vizsgálata (Seismic performance assessment of Hungarian girder bridges), *Magyar Építőipar* LXIII:(2) pp.74-80, 2013 (in Hungarian)
8. **Zsarnóczyay Á.**, Vigh L.G., Kihajlásbiztos merevítőrudak kísérleti vizsgálata (Experimental analysis of Buckling Restrained Braces), *Magyar Építőipar* LXII:(6) pp.222-230, 2012 (in Hungarian)

Books and Reports

1. Deierlein G.G., **Zsarnóczyay Á.**, Eds., *State-of-the-Art in Computational Simulation for Natural Hazards Engineering*, Zenodo, doi: 10.5281/zenodo.2579582, 121p, 2019
2. Vigh L.G., **Zsarnóczyay Á.**, Simon J., Mahler A., Bán Z., *Helyi spektrumok alkalmazása földrengésre történő méretezésre* (Using site-specific response spectra for structural design), Hungarian Chamber of Engineers, 80p, 2018
3. **Zsarnóczyay Á.**, Dunai L., Kaltenbach L., Kálló M., Kachichian M., Halász A., *FPC Testing of Buckling Restrained Braces using EN 15129 and ECCS test protocols – 600BCE & 825BCE final report*, Dept. of Struct. Eng., Budapest Univ. of Technology and Econ., 55p, 2011
4. **Zsarnóczyay Á.**, Dunai L., Kaltenbach L., Kálló M., Kachichian M., Halász A., *Type Testing of Buckling Restrained Braces According to EN 15129 – EWC500 final report*, Dept. of Struct. Eng., Budapest Univ. of Technology and Econ., 39p, 2011
5. **Zsarnóczyay Á.**, Dunai L., Kaltenbach L., Kálló M., Kachichian M., Halász A., *Type Testing of Buckling Restrained Braces According to EN 15129 – EWC800 final report*, Dept. of Struct. Eng., Budapest Univ. of Technology and Econ., 44p, 2011

Open Source Software Publications

1. **Zsarnóczyay Á.**, pelicun: Probabilistic Estimation of Losses, Injuries, and Community resilience Under Natural disasters (v2.0), Zenodo, doi: 10.5281/zenodo.3491100, 2019
2. **Zsarnóczyay Á.**, McKenna F., Wang C., Elhaddad W., Gardner M., PBE: Performance Based Engineering Application (v2.0), Zenodo, doi: 10.5281/zenodo.3491145, 2019
3. Elhaddad W., McKenna F., Rynge M., Lowe J.B., Wang C., **Zsarnóczyay Á.**, rWHALE: regional Workflow for Hazard And Loss Estimation (v1.1), Zenodo, doi: 10.5281/zenodo.2554610, 2019
4. McKenna F., Padhye N., **Zsarnóczyay Á.**, quoFEM: quantification of uncertainty and optimization in Finite Element Modeling (v2.0), Zenodo, doi: 10.5281/zenodo.1410700, 2019
5. McKenna F., Elhaddad W., Gardner M., **Zsarnóczyay Á.**, Wang C., EE-UQ: Earthquake Engineering Application with Uncertainty Quantification (v2.0), Zenodo, doi: 10.5281/zenodo.1439079, 2019

PRESENTATIONS

Peer Reviewed Conference Papers

1. **Zsarnóczyay Á.**, Advantages of Using Bayesian Inference for Model Calibration in OpenSees, OpenSees Days Europe 2017: *The 1st European Conference on OpenSees* p.6, 2017
2. **Zsarnóczyay Á.**, Vigh L.G., Effective Design Measures Against Soft Story Development in Buckling Restrained Braced Frames, *16th World Conference on Earthquake Engineering (16WCEE)* paper 4356 p.12, 2017
3. Joó A., **Zsarnóczyay Á.**, Opoldusz M., Kollár L.P., Applicability of Modal Response Spectrum Analysis on Rocking Structures, *16th World Conference on Earthquake Engineering (16WCEE)* paper 3979 p.10, 2017
4. **Zsarnóczyay Á.**, Vigh L.G., Steel4 – A Versatile Uniaxial Material Model for Cyclic Nonlinear Analysis of Steel-Based Elements, *OpenSees Days Portugal 2014: Workshop on Multi-Hazard Analysis of Structures using OpenSees* pp.11-14, 2014
5. Gulyás Gy., **Zsarnóczyay Á.**, Vigh L.G., Reliability assessment of concentrically braced frames: Risk-based seismic performance assessment of Eurocode conform design, *7th European Conference on Steel and Composite Structures (Eurosteel 2014)* p.6, 2014
6. **Zsarnóczyay Á.**, Balogh T., Vigh L.G., Design of frames with Buckling Restrained Braces – FEMA P695 based Evaluation of a Eurocode 8 Conforming Design Procedure, *7th European Conference on Steel and Composite Structures (Eurosteel 2014)* p.6, 2014
7. **Zsarnóczyay Á.**, Macedo L., Castro J.M., Vigh L.G., A novel ground motion record selection strategy for incremental dynamic analysis, *Vienna Congress on Recent Advances in Earthquake Engineering and Structural Dynamics (VEESD 2013)* paper 539. p.10, 2013
8. **Zsarnóczyay Á.**, Budaházy V., Uniaxial Material Model Development for Nonlinear Response History Analysis of Steel Frames, *Second Conference of Junior Researchers in Civil Engineering* pp. 307-317, 2013
9. Budaházy V., **Zsarnóczyay Á.**, Vigh L.G., Dunai L., Numerical model development for cyclic hardening investigation of steel-yield based displacement dependent devices, *15th World Conference on Earthquake Engineering (15WCEE)* paper 5222 p.10, 2012
10. **Zsarnóczyay Á.**, Vigh L.G., Capacity design procedure evaluation for buckling restrained braced frames with incremental dynamic analysis, *15th World Conference on Earthquake Engineering (15WCEE)* paper 3533 p.10, 2012
11. **Zsarnóczyay Á.**, Seismic Performance evaluation of buckling restrained braces and frame structures, *9th fib International PhD Symposium in Civil Engineering* pp.195-200, 2012
12. **Zsarnóczyay Á.**, Influence of Plastic Mechanism Development on the Seismic Performance of Buckling Restrained Braced Frames – case study, *Conference of Junior Researchers in Civil Engineering* pp.289-297, 2012
13. **Zsarnóczyay Á.**, Vigh L.G., Experimental analysis of buckling restrained braces: Performance evaluation under cyclic loading, *6th European Conference on Steel and Composite Structures (Eurosteel 2011)* pp.945-950, 2011
14. **Zsarnóczyay Á.**, Vigh L.G., Static behavior of an innovative mounting solution for supporting structures on soft covered flat roofs, *6th International Conference on Thin Walled Structures (ICTWS 2011)* pp.657-664, 2011
15. **Zsarnóczyay Á.**, Vigh L.G. Kihajlásbiztos merevítőrúd ciklikus viselkedésének elemszintű modellezése (Component-level model development for the cyclic response of a Buckling Restrained Brace), *XI. Magyar Mechanikai Konferencia* 109. cikk, p.9, 2011 (in Hungarian)
16. **Zsarnóczyay Á.**, Kollár L.P., Vigh L.G., Seismic performance and design possibilities of conventional girder bridges in moderate seismic regions, *14th European Conference on Earthquake Engineering (ECEE 2010)* paper 1823 p.8, 2010

ACADEMIC AND PROFESSIONAL SERVICE

Committees

Chair of the Organizing Committee for
Workshop on Simulation and Data Needs to Support Disaster Recovery Planning UC Berkeley 2020

Member of the Examination Panel of six Final Exams for the B.Sc. degree BME 2015 – 2016

Theses Review

Budapest University of Technology and Economics (BME)

Ph.D. Theses, internal (first-round) reviewer (2) 2015 – 2016

M.Sc. Theses (8) 2015 – 2016

B.Sc. Theses (10) 2014 – 2016

Journal Article Review

Earthquake Spectra 2019 – present

Engineering Structures 2018 – present

Journal of Structural Engineering 2017 – present

Periodica Polytechnica in Civil Engineering 2015 – present

PROFESSIONAL EXPERIENCE

Structural Engineer

Consultant 2016 – present

Developed a stochastic model and performed numerical analyses to define site-specific surface design spectra for prominent Hungarian construction projects (e.g., Puskás National Stadium, MOL Headquarters, Agora Budapest)

Member of the structural-engineer working group at BME 2010 – 2017

Performed in-situ measurements, developed numerical models, and wrote sections for technical reports for site testing and independent design verification of prominent Hungarian bridges (e.g. Rákóczi Bridge, Hárosi Bridge, Tiszavirág Bridge, Southern Railway Bridge)

Software developer

2010 – 2018

Developed Delphi code for AxisVM, the market-leading finite element analysis environment in Hungary. Features added: wind, snow, and pushover load generation; approximate critical flexural buckling length calculation.

PROFESSIONAL AFFILIATIONS

Earthquake Engineering Research Institute (EERI), member 2018 – present

Stanford Urban Resilience Initiative (SURI), collaborator 2018 – present

Hungarian Steel Structure Association (MAGÉSZ), member 2014 – present

Zielinski Szilárd Civil Engineering College for Advanced Studies, senior member (president in 2007) 2006 – present

LANGUAGE PROFICIENCY

Hungarian native speaker

English full professional 99% TOEFL iBT in 2009

German intermediate (passive) intermediate level language prof. test in 2003

Japanese lower intermediate (passive) 3 kyuu JLPT in 2008