

STEFAN SZYNISZEWSKI

Department of Civil Engineering
University of Surrey
Guildford, GU2 9GB

s.szyniszewski@gmail.com
s.szyniszewski@surrey.ac.uk

P.E. LICENSE

Licensed Professional Engineer in California. #79332

EDUCATION

Ph.D.	University of Florida. Structural Engineering	2005–08
M.S.	RWTH-Aachen/Warsaw University of Technology. Structural Engineering. Minor: Mechanical Engineering	2002–03
B.S.E.	Warsaw University of Technology. Civil Engineering with Honors and Distinction	1998–2002

EXPERIENCE

University of Surrey	Lecturer in Infrastructure Engineering 12/2012 – present <ul style="list-style-type: none">Supervised research on materials and structures (metallic foam bridge decks, seismic engineering, progressive collapse, offshore structures (oil and gas, and wind farms),Educated students in Integrated Design, Mathematics and Seismic Engineering,Chairs Departmental Ethics Committee and International Exchanges.
The Johns Hopkins University	Post-Doctoral Researcher/ Research Engineer <ul style="list-style-type: none">Modeling of Metallic Woven Materials 01/2012 – 12/2012<ul style="list-style-type: none">Developed model of frictional damping,Verified simulated kinematics of frictional damping with experimental results,Guided and mentored early career researchers (Stephen Ryan and Yong Zhang),Articulated and disseminated key findings in scholarly publications.Energy Dissipation and Buckling Mitigation with Steel Foams 08/2010 – 10/2012<ul style="list-style-type: none">Developed a guide for compressive buckling design of steel foam panels,Derived a design guide for compressive resistance of sandwich box columns,Developed simulations of steel foam materials (LS-DYNA),Invented a seismic energy dissipator engaging steel foam only in compression.Structural Resiliency under Impact 9/2011 – 10/2012<ul style="list-style-type: none">Developed computational models of archetypical steel and reinforced concrete buildings for structural impact analysis (LSDYNA),Automated simulations of buildings under projectile impact to enable parametric studies. The simulations account for buckling, element failure, fragmentation, and contact forces as well as material and geometrical nonlinearities.Steel Buildings under Earthquake Loading 5/2011 – 12/2011<ul style="list-style-type: none">Conducted time-history simulations of archetypical steel buildings under devastating earthquake motions (LSDYNA),Evaluated post-earthquake damage to the load carrying members, and retrieved slab accelerations and inter-story drifts for evaluation of nonstructural damage,Mentored and advised four researchers working on estimates of casualties, and agent-based evacuation models.
Bechtel Power	Structural Engineer III <ul style="list-style-type: none">U.S. EPR Pressurized Water Reactor, AREVA-Bechtel 3/2009 – 8/2010<ul style="list-style-type: none">Developed seismic calculations for safety-related electrical subsystems. Researched joint stiffness, natural frequencies and robust seismic configurations,Answered Nuclear Regulatory Commission (NRC) Requests for Additional Information (RAI),Reviewed AREVA's reactor building calculations, specifically containment

- post-tensioning forces,
 - Assisted AREVA with the transfer of FE results to the detailed design work process (worked 3-months in AREVA headquarter in Charlotte, NC),
 - Developed a sub-modeling procedure for a detailed design of individual slabs,
 - Proposed a multivariate sorting algorithm for the selection of critical loads from a full set of 4000 nonlinear load combinations,
 - Originated concrete creep testing, embedded steel specifications, and design, criteria for in- and pre-service containment inspections Design Criteria was prized by UniStar (the owner).
 - Turkey Point **Nuclear Power** Facility, with Florida Power and Light 5/2010– 8/2010
 - Evaluated safety of the existing turbine building against increased loads resulting from upgraded pumps, valves and other mechanical equipment.
 - **Progressive Collapse** of Moment Resisting Steel Framed Buildings
Research Assistant 1/2007 – 1/2009
 - Developed fast-running, physics-based simulation of progressive collapse of steel buildings (ANSYS/ LS-DYNA),
 - Established energy-based analysis of disproportionate collapse (MATLAB),
 - Developed probabilistic characterization of building resistance to disproportionate collapse, considering multiple scenarios of local failures.
 - **Structural Health Monitoring** of Experimental Bridge on Anna Maria Island, Florida
Research Assistant 1/2006 – 12/2006
 - Designed and fabricated durability segments for long-term corrosion monitoring of prestressed concrete piles,
 - Supervised two graduate and three undergraduate students during manufacturing of corrosion sensors,
 - Inspected pile driving, and substructure erection of Key Royal Bridge on Anna Maria Island, FL.
 - Enhanced Rock-Fall Resistance of **Rock-Shed Protective Structures**
Research Engineer 08/2003 – 5/2005
 - Designed testing frame for full-scale impact experiments,
 - Carried out compression, split tension, four point bending and fracture toughness material tests,
 - Conducted real-scale testing of concrete plates under concentric point loading,
 - Carried out free-fall impact experiments on concrete plates,
 - Analyzed results using finite element method (ADINA).
 - **High-rise construction** in the city of London, United Kingdom
Professional Trainee 6/2002– 8/2002
 - Assisted site surveying giving me understanding of modern steel construction,
 - Checked compatibility of design drawings from contractors,
 - Assisted in cost optimization of firewalls (minimized the number of fire-rated openings in the walls).
- University of Florida*
- Structural Impact (Kanazawa, Japan)*
- Bovis Lend Lease*

RESEARCH

- Funding** | *Active Projects:*
- EU CIG: Multi-Physical Structures through the use of Metallic Foam Sandwich Panels (PI) *European Commission*, 03/2014 – 03/2018, \$140,000.

HONORS AND AWARDS

- IABSE** | *Best Paper Award for "Progressive Collapse Simulation of Steel Frame Structures - Accomplishments and Validation Challenges", IABSE Conference Helsinki, Finland 2008,*
- Fulbright Monbusho** | *Award to study structural dynamics at the University of Florida 2005, Grant to investigate structural impact at Kanazawa University, funded by Japanese Ministry of Education, Culture, Sports, Science, and Technology, Japan 2003-05,*
- DAAD** | *Award to study "Simulation Techniques in Mechanical Engineering" at RWTH-Aachen, funded by German Academic Exchange Services, Germany 2002-03.*

EXTERNAL SERVICE & ACTIVITIES

- | | | |
|-----------------|--|--------------|
| Journal | <i>Elsevier Engineering Structures</i> | 2010–present |
| Reviewer | <i>Springer Structural and Multidisciplinary Optimization</i> | 2008–present |
| | <i>AISC Engineering Journal</i> | 2012–present |
| | <i>Wiley Computer-Aided Civil and Infrastructure Engineering</i> | 2012–present |
| Member | <i>American Society of Civil Engineers (ASCE)</i> | 2007–present |
| | <i>American Institute of Steel Construction (AISC)</i> | 2007–present |
| | <i>International Assoc. Of Bridge and Structural Engineers (IABSE)</i> | 2006–present |

SKILLS AND COMPETENCES

- Computing** |
- *High performance computing: Linux environment, PBS queues and scripts*
 - *Finite Elements: LS-DYNA, ANSYS, ADINA,*
 - *Programming: PERL, C++,*
 - *Mathcad, MATLAB.*
- Analytical** |
- *Structural mechanics:*
 - *Extreme dynamics (impact, blast, progressive collapse),*
 - *Plasticity, characterization and modeling of materials,*
 - *Sandwich structures,*
 - *Buckling and stability,*
 - *Failure analysis.*
- Experimental** |
- *Structural testing:*
 - *free-fall impact experiments on concrete and steel fiber reinforced plates,*
 - *Static load tests on concrete plates,*
 - *Dynamic forces during pile driving,*
 - *Material tests: compression, split tension, four point bending, fracture toughness.*
- Leadership** |
- *Management:*
 - *Mentored and provided guidance to junior engineers at Bechtel Power,*
 - *Supervised students at the Johns Hopkins University and University of Florida.*
 - *Interdisciplinary coordination:*
 - *Worked with mechanical, plant design, project controls, electrical and other disciplines at Bechtel Power to reach mutually beneficial solutions,*
 - *Coordinated and collaborated with researchers from Northeastern University and UMass at Amherst during a joint project on applications of steel foams.*

JOURNAL PUBLICATIONS:Published/In Press/Accepted

- (7) **Szyniszewski S**, Smith BH, Hajjar JH, Schafer BW, Arwade S (2014) “The mechanical properties of a sintered, hollow sphere, steel foam.” *Elsevier Materials&Design* 54:1083–94,
- (6) **Szyniszewski S**, Smith BH, Arwade S, Hajjar JH, Schafer BW (2012). “Buckling strength of steel foam sandwich panels.” Elsevier *Thin-Walled Structures* 59:11–9,
- (5) **Szyniszewski S**, Krauthammer T (2012). “Energy flow in progressive collapse of steel framed buildings.” Elsevier *Engineering Structures* 42:142–53,
- (4) Smith BH, **Szyniszewski S**, Hajjar JF, Schafer BW, Arwade SR. (2012) “Characterization of Steel Foams for Structural Components” *Metals* 2(4):399-410,
- (3) Smith BH, **Szyniszewski S**, Hajjar JF, Schafer BW, Arwade SR (2012). “Steel foam for structures: a review of applications, manufacturing and material properties”. Elsevier *Journal of Constructional Steel Research*, 71:1-10,
- (2) Prokopow P, **Szyniszewski S**, Pomorski K (2005). “The effects of changes in the timing of muscle activation on jump height: A simulation study.” *Human Movement*, 6(2):116-123,
- (1) **Szyniszewski S**, Akada T, Masuya H, Kajikawa Y (2004). “Numerical Simulation of a Concrete Plate subjected to Impact Load.” *JSCE Journal of Applied Mechanics*, 7(1):635-42.

PATENTS:

Szyniszewski S. “Adaptive Controller of Natural Frequencies of a Wind Turbine Tower.” UK1321121.4, 2014.

RESEARCH REPORTS FOR U.S. ARMY CORPS OF ENGINEERS

- (2) **Szyniszewski S**, Krauthammer T, Yim HC, “Energy Flow Based Progressive Collapse Studies of Moment Resisting Steel Framed Buildings,” *Final Report to U.S. Army ERDC, CIPPS-TR-003-2008*, Center for Infrastructure Protection and Physical Security, University of Florida, January 2009,
- (1) Krauthammer T, Yim HC, **Szyniszewski S**, Henriquez N, “Review of Progressive Collapse Studies,” *Final Report to U.S. Army ERDC, CIPPS-TR-001-2008*, Center for Infrastructure Protection and Physical Security, University of Florida, January 2008.

CONFERENCE PAPERS - REFEREED

- (6) Li Z, **Szyniszewski S** (2013). “Finite prism elastic buckling analysis and application in steel foam sandwich members.” *2012 Structural Stability Research Council (SSRC) Annual Stability Conference, NASCC*; April 16-20, 2013, Saint Louis, MO
- (5) **Szyniszewski S**, Smith BH, Hajjar JF, Arwade SR, Schafer BW (2012). “Local buckling strength of steel foam sandwich panels.” *2012 Structural Stability Research Council (SSRC) Annual Stability Conference, NASCC*; April 18-21, 2012, Grapevine, TX
- (4) **Szyniszewski S** (2011). “Expected Building Damage using Stratified Systematic Sampling of Failure triggering Events.” *First International Conference on Vulnerability and Risk Analysis and Management (ICVRAM)* American Society of Civil Engineers (ASCE). April 11-13, 2011, Hyattsville, MD, USA
- (3) **Szyniszewski S** (2010). “Effects of Random Imperfections on Progressive Collapse Propagation.” *Structures Congress*, American Society of Civil Engineers (ASCE). May 12-15, 2010, Orlando, FL, USA
- (2) **Szyniszewski S** (2009). "Probabilistic Approach to Progressive Collapse Prevention. Physics Based Simulations." *Structures Congress*, American Society of Civil Engineers (ASCE). April 30-May 2, 2009. Austin, TX, USA
- (1) **Szyniszewski S** (2009). "Dynamic Energy Based Method for Progressive Collapse Analysis." *Structures Congress*, American Society of Civil Engineers (ASCE). April 30-May 2, 2009. Austin, TX, USA

CONFERENCE PAPERS – NOT REFEREED

- (19) **Szyniszewski S**, Smith BH, Zeinoddini VM, Hajjar JF, Arwade SR, Schafer BW (2012). "Towards the design of cold-formed steel foam sandwich columns." *21st International Specialty Conference on Cold-Formed Steel Structures*; October 24-25, 2012, St. Louis, MO
- (18) Liu Z, Jalalpour M, Jacques C, **Szyniszewski S**, Mitrani-Reiser J, Guest J, Igusa T, Schafer BW (2012). "Interfacing Building Response with Human Behavior Under Seismic Events." *15th World Conference on Earthquake Engineering*; September 24-28, 2012, Lisbon, Portugal
- (17) Liu Z, Jalalpour M, Jacques C, **Szyniszewski S**, Mitrani-Reiser J, Guest J, Igusa T, Schafer BW (2012). "Seismic evacuation model accounting for human-structure interaction." *Second International Conference on Evacuation Modeling and Management*; August 13-15, 2012, Chicago, IL
- (16) **Szyniszewski S**, Smith BH, Arwade SR, Schafer BW, and Hajjar JF (2012). "Reliability of Steel Foam Components." *2012 Joint Conference of the Engineering Mechanics Institute and 11th ASCE Joint Specialty Conference on Probabilistic Mechanics and Structural Reliability (EMI/PMC 2012)*; University of Notre Dame, June 17-20, 2012, Notre Dame, IN
- (15) **Szyniszewski S**, Smith BH, Hajjar JF, Arwade SR, Schafer BW (2012). "Local buckling strength of steel foam sandwich panels." 2012 Structural Stability Research Council (SSRC) Annual Stability Conference, NASCC; April 18-21, 2012, Grapevine, TX.
- (14) **Szyniszewski S**, Smith BH, Hajjar JF, Arwade SR, and Schafer BW (2012). "Tensile and shear element erosion in metal foams." *12th International LS-DYNA Users Conference*; June 3-6, Dearborn, MI.
- (13) Smith BH, **Szyniszewski S**, Hajjar JF, Schafer BW, Arwade SR (2012). "Material characterization and microstructural simulation of hollow spheres and PCM steel foams." *2012 Structural Stability Research Council (SSRC) Annual Stability Conference, NASCCASC*; April 18-21, 2012, Grapevine, TX.
- (12) Smith BH, **Szyniszewski S**, Hajjar JF, Schafer BW, Arwade SR (2011). "Characterization of Steel Foams for Structural Components." *7th International Conference on Porous Metals and Metallic Foams, MetFoam 2011*, September 18-21 2011, Busan, Korea
- (11) **Szyniszewski S**, Schafer BW, Hajjar JF, Smith BH, Arwade SR (2011). "Metal Foam Computational Models for New Class of Structural Applications." *ASCE Engineering Mechanics Institute Conference: EMI 2011*, Northeastern University, Boston, MA. June 2-4 2011
- (10) Smith BH, Arwade SR, **Szyniszewski S**, Schafer BW, Hajjar JF, (2011). "Modeling hollow sphere cellular metals as a random microstructure." *ASCE Engineering Mechanics Institute Conference: EMI 2011*, Northeastern University, Boston, MA. June 2-4 2011
- (9) Arwade SR, Smith BH, **Szyniszewski S**, Schafer BW, and Hajjar JF (2011). "Review of Steel Foams: Processing, Properties, and Applications," *ASCE Engineering Mechanics Institute Conference: EMI 2011*, Northeastern University, Boston, MA. June 2-4 2011
- (8) Arwade S, Hajjar J, Schafer B, Moradi M, Brooks S, **Szyniszewski S** (2011). "Steel Foam Material Processing, Properties, and Potential Structural Applications." *National Science Foundation (NSF) CMMI Grantees Conference*. January 2011, Atlanta, USA
- (7) **Szyniszewski S**, "Probabilistic Scenario Approach to Progressive Collapse." *33rd IABSE Symposium*, September 9-11, 2009, Bangkok, Thailand
- (6) **Szyniszewski S**, "Dynamic Energy Balance Approach to Progressive Collapse Prevention." *33rd IABSE Symposium*, September 9-11, 2009, Bangkok, Thailand
- (5) **Szyniszewski S** (2009). "Energy flow approach to analysis of progressive collapse." *Thematic Conference, Smart Structures and Materials (SMART'09)*, 13-15 July 2009, Porto, Portugal
- (4) **Szyniszewski S**, Krauthammer T (2008). "Importance of Inertia Effects in Progressive Collapse Simulation of Steel Frame Buildings." *Department of Defense Explosive Safety Board (DDESB) Seminar*. August 12-14, 2008. Palm Springs, California, USA
- (3) **Szyniszewski S**, Hamilton HR, Chih-Tsai Y (2008). "Wireless Sensors in Prestressed Concrete Piles - Combining Driving Control with Long Term Monitoring." *IABSE Conference on Information and Communication Technology (ICT) for Bridges, Buildings and Construction Practice*. June 3-6, 2008. Helsinki, Finland

- (2) **Szyniszewski S**, Krauthammer T (2008). "Progressive Collapse Simulation of Steel Frame Structures. Accomplishments and Validation Challenges." *LABSE Conference on Information and Communication Technology (ICT) for Bridges, Buildings and Construction Practice*. June 3-6, 2008. Helsinki, Finland
- (1) Prokopow P, **Szyniszewski S**, Himeno R (2005). "Effects of Timing of Muscle Activation on Performance in Human Vertical Jump." *XXth Congress of the International Society of Biomechanics*. July 31-August 05, 2005. Cleveland, USA

INVITED SEMINARS

- (3) **Szyniszewski S** (2011). "Porous Steel - Properties, Manufacturing, Modeling and Practical Applications." *Institute of Fundamental Technological Research, Polish Academy of Sciences (IPPT PAN)*. June 16, 2011. Warsaw, Poland
- (2) **Szyniszewski S** (2009). "Dynamic Energy based Method for Progressive Collapse Analysis." *Tampere University of Technology*. January 06-07, 2009. Tampere, Finland
- (1) **Szyniszewski S**, Hamilton HR (2007). "Experimental Prestressed Concrete Piles for the Key Royal Bridge." *Florida Department of Transportation FTBA/FDOT Statewide Construction Conference*. February 27-28, 2007. Orlando, FL, USA