



**David (Jared) DeBock, PhD, PE**

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## CURRICULUM VITAE

Dr. DeBock is an assistant professor of Civil Engineering at California State University, Chico. His interests include applied research on the topics of extreme loading (primarily earthquake and snow), development of building codes and standards, building seismic risk assessment, and regional seismic risk assessment. Dr. DeBock has industry experience with design, construction, and repair of buildings, as well as software development. His areas of expertise include performance-based earthquake engineering, nonlinear structural modeling, data analysis, and application of probabilistic methods to solving engineering problems and gauging risk.

### EDUCATION

Ph.D., Civil, Environmental and Architectural Engineering, University of Colorado, Boulder.  
Boulder, CO, 2013.

Thesis: "Advancements to Performance-Based Earthquake Engineering Methods: From Building Code Provisions to Regional Loss Assessment."

Advisor: Abbie B. Liel.

M.S., Civil, Environmental and Architectural Engineering, University of Colorado, Boulder.  
Boulder, CO, 2012.

B.S., Civil Engineering, California State University, Chico. Chico, CA, 2010 (*Honors, Summa Cum Laude*).

### TEACHING EXPERIENCE

- Assistant Professor. California State University, Chico. 2015-present
  - CIVL 101: Introduction to Civil Engineering
  - CIVL 311: Strength of Materials
  - CIVL 415: Reinforced Concrete Design
  - CIVL 554: Steel Design
  - CIVL 556: Timber Design
- Masters committee member. University of Colorado, Boulder. 2014, 2018
- Tutor: Statics and Mechanics of Materials. University of Colorado, Boulder. 2012-2013
- Graduate mentor for undergraduate research program. University of Colorado, Boulder. 2012-2013
- Substitute lecturer. University of Colorado, Boulder. 2011-2013 (Intermittently)
  - Mechanics of Materials (undergraduate level)
  - Earthquake Engineering (graduate level)
- Earthquake engineering instruction for undergraduate EERI seismic design team. University of Colorado, Boulder. 2012

- Teaching Assistant. Mechanics of Materials. University of Colorado, Boulder. 2010-2011
- Instructional Student Assistant. California State University, Chico. 2008-2009
  - Strengths of Materials
  - Engineering Economy and Statistics

## RESEARCH

### *Research Conducted at CSU Chico*

- Rapid Calculation of Earthquake Damage and Repair Costs for High-Performance Building Design. 2015-present
  - NSF Award No 1632429.
  - Software development; nonlinear structural modeling and analysis; extensive contributions to a building structural properties module, a wood light-frame module, a tilt-up module, and a foreshock/aftershock sequencing module.
  - Products/outcomes: Conference papers, webinars, improvements to the Seismic Performance Prediction Program (SP3) and development of new risk tool (to be released soon).
- Improving seismic design of buildings with configuration irregularities. Applied Technology Council (ATC) Project 123. 2015-present
  - FEMA contract HSFE60-12-D-0242.
  - Responsibilities: Oversee the design of 100+ archetype concrete moment frame buildings; build a framework for nonlinear modeling of steel and concrete frame structures; design and analyze 2000+ “simplified” three-dimensional models to assess building torsion responses.
  - Products/outcomes: Conference papers, invited presentations.
  - Anticipated products/outcomes: Technical report, journal article(s), improvements and updates to the national building standard ASCE/SEI 7.
- Develop improved methods for computing probabilistic regional risks due to earthquakes and spatial correlations among nonlinear multi-degree-of-freedom building responses for communities of buildings. 2012-present
  - Partially funded by CSU Chico RSG grant.
  - Responsibilities: Conduct sensitivity studies to determine important aspects of regional seismic risk assessment; develop a Monte Carlo simulation tool for conducting regional seismic risk assessments; investigate simplified alternatives for portfolio seismic risk assessment; oversee a student researcher assessing retrofit impacts on communities of buildings.
  - Products/outcomes: several publications and presentations.
  - Anticipated outcomes: influence on a new ASTM standard.

- Solutions to the issues of short-period building seismic performance. 2015-2016  
Applied Technology Council (ATC) Project 116.
  - FEMA Contract HSFE60-17-D-0002.
  - Responsibilities: Design a suite of residential and commercial wood light-frame buildings and perform quality control assessments for a team that created nonlinear models of those buildings.
  - Products/outcomes: Technical report (in press).
  
- Reliability-consistent design ground snow load maps for the state of Colorado. These are the first ever snow loads for building design that are based on a target building reliability, rather than a target hazard. Work conducted in conjunction with the Structural Engineers Association of Colorado (SEAC) snow loading committee. 2014-2016
  - Responsibilities: Gather and analyze historical ground snow load data for the state of Colorado; develop a Monte Carlo simulation framework using novel regression, distribution fitting, and importance sampling techniques; create digital design snow load maps for the state of Colorado.
  - Products/outcomes: New design snow loads for the state of Colorado (adopted by SEAC and ASCE/SEI 7-16), technical report, two journal articles, conference proceedings, Web-based Google Earth snow loading map for Colorado.

*Research Prior to Joining CSU Chico*

- Building Seismic Safety Council Simplified Seismic Design Procedures Development Program. 2011-2013, 2016
  - Products/outcomes: Improvements ASCE/SEI 7 provisions for accidental torsion and for simplified seismic design, Journal article, Report.
  
- Beta test Performance Assessment Calculation Tool (PACT). ATC project 58. Work conducted in conjunction with ATC working group. 2010
  
- Assess conditional spectrum based ground motion selection methods for nonlinear dynamic time-history structural analysis. Undergraduate research. 2010
  
- Assess a buckling-restrained braced frame building with the FEMA P-695 methodology. Undergraduate research. 2009
  
- Develop educational materials for Civil Engineering applications of tire-derived aggregates. Undergraduate research. 2008

## ENGINEERING CONSULTING

- University of California seismic risk review. 2018-present
  - Peer review for seismic hazard and risk assessment process used by the University of California to rank all of their existing buildings.
- Develop design seismic response coefficients for a new proprietary building system, using quantitative analytical analysis. This project is the first of its kind in the Structural Engineering profession. It is a collaborative research and development project led by J.R. Harris and Company, also involving faculty at CSU Fort Collins and CU Denver. 2016-present
  - Responsibilities: Develop nonlinear models of building components and structural systems, based on analytical data and test data; analyze archetype buildings using incremental dynamic analysis to determine collapse resistance.
- Project Engineer. J.R. Harris and Company, Denver, CO. 2014-2015
  - Design: Timber, steel, and concrete.
  - Analysis/forensics/repair: Structural vibrations, relative foundation displacements, load testing, inspection of damaged/aging structures.

## STUDENT RESEARCHERS ADVISED

\*Asterisks denote students advised while at CSU Chico

- \*Aileen Escobol (CSUC, class of 2020) 2018
- \*Lince Martin (CSUC, class of 2020) 2018
- \*Noah Marcias (CSUC, class of 2019) 2017-2018
- \*Samantha Grey (MS Candidate at University of Colorado, Boulder) 2016-2018
- \*Marisol Alvarez (CSUC, class of 2019) 2017
- \*Sarah Essila (Culp and Tanner Structural Engineers) 2016-2017
- Kevin Kim (Tuan and Robinson Structural Engineers) 2012-2013

## SERVICE (SELECTED)

- Master's thesis committee member (Samantha Grey, CU Boulder) 2018
- Faculty search committee 2015/16, 2017/18
- RTP committee for CIM Lecturers 2018
- ASTM subcommittee WK55885 – seismic risk assessment of real estate portfolios 2017-present
- Mid-PAC Geo-wall competition faculty mentor 2015-present
- Mid-PAC Steel Bridge competition faculty mentor 2015-2017

- Peer Reviewer 2015-present  
 Bulletin of Earthquake Engineering (Springer)  
 Earthquake Spectra (Earthquake Engineering Research Institute)  
 Journal of Cold Regions Engineering (American Society of Civil Engineers)  
 Journal of Earthquake Engineering (Taylor and Francis)  
 Natural Hazards Review (American Society of Civil Engineers)  
 Structures (Elsevier)  
 11NCEE National Conference proceedings (Earthquake Engineering Research Institute)

### **PROFESSIONAL QUALIFICATIONS AND MEMBERSHIPS**

- Registered Professional Engineer. License number C86354/CA 2016-present
- Member: Earthquake Engineering Research Institute (EERI) 2018-present
- Member: American Institute of Steel Construction (AISC) 2017-present
- Member: Structural Engineers Association of (Northern) California (SEAONC) 2016-present
- Member: Structural Engineering Institute (SEI) 2009-present
- Member: American Society of Civil Engineers (ASCE) 2009-present
- Member: Golden Key Honors Society 2007-present
- Member: Structural Engineers Association of Colorado (SEAC) 2014-2015
  - Snow loading committee (activity maintained after moving to CSU Chico, although no longer an official member)
  - Seismic committee
- Vice President: Earthquake Engineering Research Institute (EERI) student chapter, CU Boulder 2012-2013

### **HONORS AND ACHIEVEMENTS**

- Faculty appointment. California State University, Chico. 2015
- Research Assistant appointment. University of Colorado, Boulder. 2011-2013
- Teaching Assistant appointment. University of Colorado, Boulder. 2010-2011
- Summa Cum Laude. California State University, Chico. 2010
- Honors in General Education. California State University, Chico. 2010
- Sacramento ASCE Academic Achievement Award. 2009
- Sacramento APWA Academic Excellence Scholarship. 2009
- Dean's Honor List, California State University, Chico. 2006-2010
- Dean's Performance Scholarship, California State University, Chico. 2005-2009

## PUBLICATIONS AND PRESENTATIONS

\*Asterisks denote publications authored since joining CSU Chico in 2015

### *Journal Articles in Preparation*

\***DeBock, D.J.**, M. Valley, C.B. Haselton (2018). “Quantitative assessment of seismic design provisions for buildings with torsional irregularities.” *Earthquake Spectra*. Submission planned for Winter 2018/19.

\*Wade, K.F., **D.J. DeBock**, M. Valley, T. Sabol, C.B. Haselton (2018). “Quantitative assessment of seismic design provisions for moment frame buildings with vertical irregularities.” *Earthquake Spectra*. Submission planned for Winter 2018/19.

### *Refereed Journal Articles*

\***DeBock, D.J.**, A.B. Liel, J.R. Harris, B.R. Ellingwood, J.M. Torrents (2016). “Reliability-based design snow loads: I. Site-specific probability models for ground snow loads.” *Journal of Structural Engineering*: 04017046.

\*Liel, A.B., **D.J. DeBock**, J.R. Harris, B.R. Ellingwood, J.M. Torrents (2016). “Reliability-based design snow loads: II. Reliability assessment and mapping procedures.” *Journal of Structural Engineering*: 04017047.

\***DeBock, D.J.** and A.B. Liel (2015). “A comparative evaluation of probabilistic regional seismic loss assessment methods, using scenario case studies.” *Journal of Earthquake Engineering*. 19(6), pp. 905-937.

**DeBock, D.J.**, J.W. Garrison, K.Y. Kim, and A.B. Liel (2014). “Incorporation of spatial correlations between building response parameters in regional seismic loss analysis.” *Bulletin of the Seismological Society of America*, 104(1), pp. 214-228.

**DeBock, D.J.**, A.B. Liel, C.B. Haselton, J.D. Hooper, and R.A. Henige Jr. (2014). “Importance of seismic design accidental torsion requirements for building collapse capacity.” *Earthquake Engineering and Structural Dynamics*. 43(6), pp. 831-850.

### *Fully Refereed Conference Articles*

\***DeBock, D.J.**, D.T. Cook, C.B. Haselton, K.F. Wade (2018). “New developments for rapid seismic risk assessment of wood light-frame buildings.” *Proceedings of the 11th National Conference in Earthquake Engineering*, Earthquake Engineering Research Institute, Los Angeles, CA.

\***DeBock, D.J.**, M. Valley (2018). “New studies to assess and improve seismic torsion design provisions.” *Proceedings of the 11th National Conference in Earthquake Engineering*, Earthquake Engineering Research Institute, Los Angeles, CA.

\***DeBock, D.J.**, K.F. Wade, D.T. Cook, C.B. Haselton, M. Valley, T. Sabol T (2018). “Quantitative assessment of code provisions for vertical building irregularities in frame buildings.” *Proceedings of the 11th National Conference in Earthquake Engineering*, Earthquake Engineering Research Institute, Los Angeles, CA.

\*Wade, K.F., **D.J. DeBock**, J.W. Lawson, M. Koliou, D.T. Cook, C.B. Haselton (2018). “Seismic risk assessment of tilt-up buildings using the FEMA P-58 method.” *Proceedings of the 11th National Conference in Earthquake Engineering*, Earthquake Engineering Research Institute, Los Angeles, CA.

\*Cook, D., K. Wade, C. Haselton, J. Baker, **D.J. DeBock** (2018). “A structural response prediction engine to support advanced seismic risk assessment” *Proceedings of the 11th National Conference in Earthquake Engineering*, Earthquake Engineering Research Institute, Los Angeles, CA.

**DeBock, D.J.**, A.B. Liel, J.R. Harris (2015). “Reliability-based snow load maps for building design.” *12th International Conference on Applications of Statistics and Probability in Civil Engineering (ICASP)*. Vancouver, Canada.

**DeBock, D.J.**, K.Y. Kim, and A.B. Liel (2013). “A scenario case study to evaluate methods of seismic loss assessment for communities of buildings.” *11<sup>th</sup> International Conference on Structural Safety and Reliability (ICOSSAR)*. New York, NY.

#### *Conference Articles – Refereed by Abstract Only*

\***DeBock, D.J.**, M. Valley (2018). Evaluation of seismic design provisions for torsionally irregular buildings. *Proceedings of 2018 SEAOC Convention*. Palm Desert, CA.

\*Wade, K.F., **D.J. DeBock**, C.B. Haselton, D.T. Cook, E. Almeter (2018). “Expected performance of new building-code-compliant buildings in California.” *Proceedings of 2018 SEAOC Convention*. Palm Desert, CA.

\*Wade, K.F., **D.J. DeBock**, D.T. Cook, C.B. Haselton, M. Valley, T. Sabol (2018). “Quantitative evaluation of code provisions for vertically irregular frame buildings.” *Proceedings of 2018 SEAOC Convention*. Palm Desert, CA.

\***DeBock, D.J.**, D.T. Cook, K.F. Wade, C.B. Haselton, M. Valley (2017). “New studies on effects of torsional irregularities.” *Proceedings of 2017 Los Angeles Tall Buildings Structural Design Council*. Los Angeles, CA.

\***DeBock, D.J.**, K.F. Wade, D.T. Cook, C.B. Haselton (2016). “FEMA P-58: New developments in the analysis process for wood light-frame buildings.” *Proceedings of 2016 SEAOC Convention*. Maui, HI.

\***DeBock, D.J.** and A.B. Liel (2015), “A move toward improved portfolio seismic risk assessment methods for the practicing engineer.” *2<sup>nd</sup> ATC-SEI Conference on Improving Seismic Performance of Existing Buildings and Other Structures*. San Francisco, CA. pp. 435-446.

#### *Reports/Theses*

\*FEMA (2018). FEMA P-2012: Assessing seismic performance of buildings with configuration irregularities: Calibrating current standards and practices. Prepared by ATC for FEMA. *In press*.

\*ATC (2018). Solutions to the issue of short period building performance (ATC 116). Prepared by ATC for FEMA. *In Press*.

\*SEAC (2016). Colorado design snow loads. Published by Structural Engineers Association of Colorado.

BSSC (2015). Report on the 2015 NEHRP chapter 24 stand-alone seismic design requirements for SDC B buildings. Prepared under the BSSC simplified seismic design procedures development program.

**DeBock, D.J.** (2013). Advancements to performance-based earthquake engineering methods: From building code provisions to regional loss assessment. Doctoral dissertation, CU Boulder.

FEMA (2012a). FEMA P-58: Seismic performance assessment of buildings: Volume 1- methodology. Prepared by ATC for FEMA.

FEMA (2012b). FEMA P-58: Seismic performance assessment of buildings: Volume 2- implementation guide. Prepared by ATC for FEMA.

### *Web applications*

\*SEAC (2016). 2016 Colorado ground snow map. Published by Structural Engineers Association of Colorado. Available at <http://seacolorado.org/publications/>

### *Invited Presentations and Webinars*

\***DeBock D.J.**, M. Valley (2018). “Studies on effects of torsional irregularities.” *FEMA P-2012 Workshop: Improving seismic design of buildings with configuration irregularities, Burlingame, CA*. July.

\*Lawson, J, M. Koliou, **D.J. DeBock**, K. Wade (2017). “Building-specific risk assessment for tilt-up buildings: new beta module of SP3. *SP3 Webinar Series by Haselton Baker Risk Group*.

\***D.J. DeBock**, D. Cook (2017). “Building-specific risk assessment for wood light-frame buildings. *SP3 Webinar Series by Haselton Baker Risk Group*.

\*Valley, M and **D.J. DeBock** (2017). “ATC 123 configuration irregularities report.” *Building Seismic Safety Council PUC Meeting, Burlingame, CA*. August.

\***DeBock, D.J.** (2017). “New studies on effects of torsional irregularities.” *Los Angeles Tall Building Structural Design Council, Los Angeles, CA*. May.

**DeBock, D.J.**, J.R. Harris, J.M. Torrents (2015). “Reliability-based snow load maps for building design.” *Structural Engineers Association of Colorado (SEAC) General Meeting, Denver, CO*. May.

### *Posters*

**DeBock, D.J.**, J.W. Garrison, K.Y. Kim, and A.B. Liel (2013). “Incorporation of spatial correlations between building response parameters in regional seismic loss analysis.” *Earthquake Engineering Research Institute (EERI) annual meeting*. Seattle, WA.

**DeBock, D.J.**, J.W. Garrison, K.Y. Kim, and A.B. Liel (2012). “Spatial correlations in building response using simulated and recorded earthquake scenarios.” *Southern California Earthquake Center (SCEC) annual meeting*. Palm Springs, CA.