

# IOANNIS GIDARIS

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## EDUCATION

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### UNIVERSITY OF NOTRE DAME

Ph.D. Student, Civil Engineering

Thesis title: Risk assessment and optimal design of seismic protective systems  
through surrogate and reduced order modeling

Advisor: Alexandros A. Taflanidis

Notre Dame, IN  
August 2010- June 2015

### ARISTOTLE UNIVERISTY OF THESSALONIKI

M.S., Earthquake Engineering

Thesis title: Displacement based design and seismic performance assessment  
of a reinforced concrete bridge

Advisor: Andreas Kappos

Academic Honor(s): Ranked 1<sup>st</sup> among 20 students

Thessaloniki, Greece  
October 2009

### ARISTOTLE UNIVERISTY OF THESSALONIKI

B.S., Civil and Environmental Engineering, Major in Structural Engineering

Senior thesis title: Seismic response of reinforced concrete structures  
subjected to bidirectional ground motions

Advisor: Andreas Kappos

Academic Honor(s): Ranked among the top 10% of students

Thessaloniki, Greece  
July 2008

## RESEARCH INTERESTS

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- Probabilistic risk and resilience assessment of bridge and transportation infrastructure in a multiple hazard environment
- Multi-hazard modeling and assessment
- Probabilistic risk quantification and assessment
- Performance based engineering
- Stochastic simulation methods
- Optimal design of seismic protective devices
- Risk-informed multi-criteria optimization under uncertainty
- Surrogate and reduced order modeling of inelastic structural systems
- Bayesian model updating

## RESEARCH EXPERIENCE

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### RICE UNIVERSITY

#### Post-Doctoral Fellow

- Performed an extensive survey of fragility and restoration models for various transportation network constituent components and hazards that led to a state-of-the-art white paper review. This state-of-the-art review emphasizes on viable models for risk and resilience analysis of regional portfolios or transportation networks and identifies key research needs to advance fragility and restoration modeling.
- Developed a taxonomy of multi-hazard risks, categorizing the various hazard combinations into characteristic classes based on their temporal coincidence, correlation and interaction

Houston, TX  
07/2015-present

characteristics. This taxonomy facilitates developing and extending hazard input models to support multi-hazard risk and resilience assessment.

- Performed stochastic simulation based coincidence analysis for a characteristic multi-hazard combination class for different sites in the U.S., supporting the development of simplified multi-hazard probability models.

#### **UNIVERSITY OF NOTRE DAME**

Notre Dame, IN

##### **Graduate Student Researcher**

08/2010-06/2015

- Established a framework for calibration/selection of reduced order hysteretic structural models. This framework provides a valuable computational tool for efficiently simulating the seismic response of inelastic structural systems.
- Developed an efficient simulation-based stochastic search approach, facilitating the optimal design of seismic protective devices based on life-cycle cost criteria.
- Formulated a kriging surrogate modeling framework for efficient seismic risk assessment and optimal design when seismic hazard is described through stochastic ground motion models.
- Proposed a multi-criteria optimization formulation for the design of seismic protective devices, enabling the adoption of enhanced metrics of seismic risk and offering to decision-makers a range of solutions describing different decision-making attitudes towards risk.
- Proposed a reliability-based design approach for floor isolation systems, addressing the inclusion of variability of future ground motions in the optimization process and explicitly considering the nonlinear characteristics of the coupled protective and structural systems. Integrated a global sensitivity analysis methodology in the approach, investigating relative contribution of risk factors towards seismic risk.
- Implemented a Bayesian framework for assessment of deteriorating bridge infrastructure systems through use of monitoring data, allowing the update of the assessment during the life-time operation of the system.

#### **ARISTOTLE UNIVERSITY OF THESSALONIKI**

Thessaloniki, Greece

##### **Master Student Researcher**

10/2008-10/2009

- Conducted a study regarding problems associated with direct displacement based design of concrete bridges, identifying and proposing required extensions and modifications to the currently used procedure.
- Proposed an extension of direct displacement based design methodology for bridges susceptible to higher mode effects.

#### **AWARDS & FUNDING**

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- Young Researcher Best Paper Award in the *Fourth International Conference on Soft Computing Technology in Civil, Structural and Environmental Engineering*, 2015, Prague, Czech Republic, for the paper “Optimal design of floor isolation systems subjected to multiple reliability criteria utilizing kriging surrogate modeling” September 2015
- CERRA (International Civil Engineering Risk and Reliability Association) Student Recognition Award, ICASP12 student award competition February 2015
- Earthquake Engineering Research Institute (EERI) travel grant February, 2015
- Professional Development Award, Graduate School, University of Notre Dame July, 2014
- Earthquake Engineering Research Institute (EERI) travel grant February, 2013

## PUBLICATIONS

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### Journal articles

1. **Gidaris, I.**, Taflanidis, A.A., and G.P. Mavroeidis (2015). “Multi-objective design of supplemental seismic protective devices utilizing life-cycle performance criteria”. *Structural Safety* (under review, submitted August 2015)
2. **Gidaris, I.**, Taflanidis, A.A., D. Lopez-Garcia and G.P. Mavroeidis (2015). “Multi-objective risk-informed design of floor isolation systems”. *Earthquake Engineering & Structural Dynamics* (under review, submitted July 2015)
3. **Gidaris, I.**, Taflanidis, A.A. and G.P. Mavroeidis (2015). “Kriging metamodeling in seismic risk assessment based on stochastic ground motion models”. *Earthquake Engineering & Structural Dynamics*, DOI 10.1002/eqe.2586.
4. Jia, G., **Gidaris, I.**, Taflanidis, A.A. and G.P. Mavroeidis (2014). “Reliability-based assessment/design of floor isolation systems”. *Engineering Structures*, 78 (1): 41-56.
5. **Gidaris, I.** and A.A. Taflanidis (2014). “Performance assessment and optimization of fluid viscous dampers through life-cycle cost criteria and comparison to alternative design approaches”. *Bulletin of Earthquake Engineering*, DOI 10.1007/s10518-014-9646-5.
6. **Gidaris, I.** and A.A. Taflanidis. (2013) “Parsimonious modeling of hysteretic structural response in earthquake engineering: Calibration/validation and implementation in probabilistic risk assessment”. *Engineering Structures*, 49: 1017–1033.
7. Kappos, A. J., Gkatzogias, K. I., and **Gidaris, I.** (2013). “Extension of direct displacement-based design methodology for bridges to account for higher mode effects”. *Earthquake Engineering & Structural Dynamics*, 42(4), 581-602.
8. Kappos, A. J., **Gidaris, I.**, and Gkatzogias, K. I. (2012). “Problems associated with direct displacement-based design of concrete bridges with single-column piers, and some suggested improvements”. *Bulletin of Earthquake Engineering*, 10(4), 1237-1266.

### Conference proceedings

1. **I. Gidaris** and Taflanidis, A.A. (2015). Optimal design of floor isolation systems subjected to multiple reliability criteria utilizing kriging surrogate modeling. In Proceedings of the 4<sup>th</sup> *International Conference on Soft Computing Technology in Civil, Structural and Environmental Engineering, CSC2015*, September 1-4, Prague, Czech Republic.
2. **I. Gidaris**, Taflanidis, A.A., G.P. Mavroeidis and D. Lopez-Garcia (2015). Design of floor isolation systems through multi-objective criteria for the seismic-risk performance. In Proceedings of the 12<sup>th</sup> *International Conference on Applications of Statistics and Probability in Civil Engineering, ICASP12*, July 12-15, Vancouver, Canada.
3. **I. Gidaris**, Taflanidis, A.A., G.P. Mavroeidis and D. Lopez-Garcia (2015). Probabilistic assessment and reliability-based optimal design of floor isolation systems. In Proceedings of the 11<sup>th</sup> *Chilean Conference on Seismology and Earthquake Engineering*, March 18-20, Santiago, Chile.
4. Taflanidis, A.A. and **I. Gidaris** (2015). Probabilistic seismic risk assessment and multi-criteria, risk-informed design. In Proceedings of the 11<sup>th</sup> *Chilean Conference on Seismology and Earthquake Engineering*, March 18-20, Santiago, Chile.
5. **I. Gidaris**, Taflanidis, A.A. and G.P. Mavroeidis (2014). Surrogate modeling implementation for assessment of seismic risk utilizing stochastic ground motion modeling. In Proceedings of the 2<sup>nd</sup>

*European Conference in Earthquake Engineering and Seismology*, August 25-29, Istanbul, Turkey.

6. Vetter, C.R, Taflanidis, A.A., Mavroeidis, G.P and **I. Gidaris** (2014). Tuning of stochastic ground motion models for compatibility with ground motion prediction equations. In Proceedings of the 2<sup>nd</sup> *European Conference in Earthquake Engineering and Seismology*, August 25-29, Istanbul, Turkey.
7. **Gidaris, I.**, Taflanidis, A.A. and G.P. Mavroeidis (2014). Multi-objective design of fluid viscous dampers using life-cycle cost criteria. In Proceedings of the 10<sup>th</sup> *National Conference in Earthquake Engineering*, Earthquake Engineering Research Institute, July 21-25, Anchorage, AK.
8. **Gidaris, I.**, Taflanidis, A.A., and G.M. Mavroeidis (2014). “Multiobjective formulation for the life-cycle cost based design of fluid viscous dampers”. In proceedings of *IX International Conference on Structural Dynamics (EURODYN 2014)*. June 30-July 2. Porto, Portugal.
9. Taflanidis, A.A., Jia, G. and **Gidaris, I.** (2013). “Reliability-based assessment/design of floor isolation systems for protection of critical structural contents”. In proceedings of the *Vienna Congress on Recent Advances in Earthquake Engineering and Structural Dynamics & 13. D-A-CH Tagung*. August 28-30. Vienna, Austria.
10. **Gidaris, I.** and A.A. Taflanidis (2013). “Life-cycle cost based optimization of fluid viscous dampers”. In proceedings of the *Vienna Congress on Recent Advances in Earthquake Engineering and Structural Dynamics & 13. D-A-CH Tagung*. August 28-30. Vienna, Austria.
11. Taflanidis, A.A., Jia, G. and **I. Gidaris** (2013). “Reliability-based optimal design of floor isolation systems for protection of critical structural contents”. In proceedings of *11th International Conference on Structural Safety & Reliability*, June 16-20, New York, NY.
12. **Gidaris, I.** and A.A. Taflanidis (2013). “Life-cycle cost based optimization of fluid viscous dampers; design framework and trends of optimal solutions”. In proceedings of *11th International Conference on Structural Safety & Reliability*, June 16-20, New York, NY.
13. Jia, G., Taflanidis, A.A. and **I. Gidaris** (2013). “A simulation-based and reliability-based design framework for floor-isolation protective systems”. In proceedings of the *3<sup>rd</sup> International Conference on Soft Computing Technology in Civil, Structural and Environmental Engineering*. September 3-6. Sardinia, Italy.
14. Taflanidis A.A. and **I. Gidaris** (2013). “Life-cycle cost based optimal retrofitting of structures by fluid dampers”. In Proceedings of the ASCE 2013 Structures Congress. May 2-4. Pittsburgh, Pennsylvania: 1777-1788.
15. Taflanidis A.A. and **I. Gidaris** (2013). “Health monitoring and Bayesian updating of deteriorating bridge infrastructures”. In Proceedings of the ASCE 2013 Structures Congress. May 2-4. Pittsburgh, Pennsylvania: 398-409.
16. **Gidaris, I** and A. A. Taflanidis (2012). Design of fluid viscous dampers for optimal life cycle cost. In proceedings of *15th World Conference of Earthquake Engineering*, September 22-29, Lisbon, Portugal
17. **Gidaris, I** and A. A. Taflanidis (2012). Parsimonious modeling of hysteretic structural response in earthquake engineering. In proceedings of *15th World Conference of Earthquake Engineering*, September 22-29, Lisbon, Portugal
18. Taflanidis, A.A. and **I. Gidaris** (2012). “Life-cycle cost based optimal design of fluid viscous dampers”. In proceedings of *IFIP WG 7.5 Working Conference, Reliability and Optimization of Structural Systems*, June 24-27, Yerevan, Armenia.

19. Vetter, C., **Gidaris, I.**, and A.A Taflanidis (2012). “Seismic Hazard Characterization through Stochastic Ground Motion Modeling”. In Proceedings of the *ASCE 2012 Structures Congress*. May 11-17. Chicago, Illinois.
20. **Gidaris, I.** and A.A. Taflanidis (2012). “Bayesian updating of deteriorating bridge infrastructures through monitoring data”. In Proceedings of the *2012 Joint Conference of the Engineering Mechanics Institute and 11th ASCE Joint Specialty Conference on Probabilistic Mechanics and Structural Reliability*. June 17-20. Notre Dame, Indiana.
21. **Gidaris, I.** and A.A. Taflanidis (2012). “Parsimonious modeling of the hysteretic behavior of inelastic structural systems in earthquake engineering”. In Proceedings of the *2012 Joint Conference of the Engineering Mechanics Institute and 11th ASCE Joint Specialty Conference on Probabilistic Mechanics and Structural Reliability*. June 17-20. Notre Dame, Indiana.
22. Taflanidis, A.A. and **I. Gidaris** (2011). “Bayesian updating of bridge deteriorating infrastructures through monitoring data”. In Proceedings of the *ASME 2011 International Mechanical Engineering Congress and Exposition*. November 11-17. Denver, Colorado.
23. Kappos A.J., Gkatzogias, K.I and **Gidaris I.** (2011), “An improved displacement based design methodology for bridges accounting for higher mode effects”. In Proceedings of the *International Conference on Computational Methods in Structural Dynamics and Earthquake Engineering*, May 25-28, Corfu, Greece.
24. Kappos A.J., **Gidaris I.** and Gkatzogias, K.I., (2010). “An improved displacement based design procedure for concrete bridges”. In Proceedings of the *3<sup>rd</sup> International Conference on Seismic Retrofitting*, October 20-22, Tabriz, Iran.

#### **Book chapters**

1. Taflanidis, A.A. and **I. Gidaris** (2013). “Life-cycle cost based optimal design of fluid viscous dampers” in *Reliability and Optimization of Structural Systems*, Der Kiureghian, A., and A. Hajian eds. American University of America Press. ISBN 978-0-9657429-0-0.
2. Taflanidis, A.A. and **I. Gidaris** (2012). “Optimal design of nonlinear viscous dampers for protection of isolated bridges” in *Structural Seismic Design Optimization and Earthquake Engineering: Formulations and Applications*, Plevris, V., Lagaros, N and A. Mitropoulou eds. IGI Global. ISBN 978-1-466616-40-0.

#### **Invited talks, lectures and seminars**

1. Pontificia Universidad Catolica De Chile, (2015) “Risk assessment and optimal design of seismic protective systems through surrogate modeling”, Santiago, Chile, March 17, 2015

#### **Conference abstracts**

1. Taflanidis, A.A., Jia, G and **I. Gidaris**, (2015). “Seismic risk assessment for isolated bridges exposed to near-fault excitations”. In Proceedings of the *ASCE 2015 Structures Congress*. April 23-25. Portland, Oregon.
2. **I. Gidaris**, Taflanidis, A.A., G.P. Mavroeidis and D. Lopez-Garcia (2015). “Design of floor isolation systems under multiple seismic-risk criteria”. In Proceedings of the *2015 Annual EERI Conference*, March 31-April 3, Boston, Massachusetts.
3. Taflanidis A.A., Jia, G., and **I. Gidaris** (2013). “Probabilistic assessment/design of floor isolation systems using reliability criteria”. In Proceedings of the *ASCE 2014 Structures Congress*. April 3-5. Boston, Massachusetts.
4. **Gidaris, I.** and A.A. Taflanidis (2013). “Life-Cycle cost based optimization of fluid viscous dampers’ design framework and trends of optimal solutions”. In Proceedings of the *2013 Annual EERI Conference*, February 12-15, Seattle, Washington.

## **TEACHING EXPERIENCE**

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<b>UNIVERSITY OF NOTRE DAME</b>	Notre Dame, IN
<b>Assistant Instructor, Dept. of Civil and Environmental Engineering and Earth Sciences</b>	01/2015-05/2015
• Dynamics and modeling	
<b>Graduate Teaching Assistant, Dept. of Civil and Environmental Engineering and Earth Sciences</b>	08/2010-12/2012
• Introduction to structural engineering	
• Matrix Structural Analysis	

## **PROFESSIONAL MEMBERSHIPS**

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American Society of Civil Engineers (ASCE), Member	(since 2014)
Structural Engineering Institute (SEI), ASCE, Member	(since 2014)
Earthquake Engineering Research Institute (EERI), Member	(since 2010)
Technical Chamber of Greece, Member	(since 2008)
Greek Society of Professional Civil Engineering, Member	(since 2008)

## **LEADERSHIP & SERVICE**

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President, Graduate student chapter of Earthquake Engineering Research Institute (EERI), University of Notre Dame (2013-2014)
Design consultant for earthquake resilient prototype houses in Haiti, Engineering2Empower (E2E), University of Notre Dame (2011-2012)