

# MARC J. ROBINSON Ph.D., S.E.

Assistant Professor

William V. Coyle Professor of Civil and Environmental Engineering

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## **EDUCATION**

Ph.D. Structural Engineering	U.C. San Diego	2008
M.S. Civil and Environmental Engineering	Utah State University	2001
B.S. Civil and Environmental Engineering	Utah State University	1998

## **Ph.D. DISSERTATION**

“Simulation of the Vacuum Assisted Resin Transfer Molding (VARTM) Process and the Development of Light-Weight Composite Bridging” (John B. Kosmatka, Chair)

## **M.S. THESIS**

“Condition Assessment of a Six-Span, Full-Scale Bridge Using Forced Vibrations” (Marvin W. Halling, Chair)

## **PROFESSIONAL LICENSING AND CERTIFICATION**

Professional Structural Engineer, State of Utah (License No. 362296-2203)	2008
Professional Engineer, State of Utah (License No. 362296-2203)	2007
Fundamentals of Engineering (FE/EIT) Certificate	1997

## **PROFESSIONAL EXPERIENCE**

Assistant Professor	S.D. School of Mines and Tech.	9/09-present
Postdoctoral Researcher	U.C. San Diego	01/09-9/09
Graduate Research Assistant	U.C. San Diego	2002-2008
Teaching Assistant	U.C. San Diego	Fall 2005
Project Engineer	Allen and Bailey/ABS Consulting	2000-2002
Graduate Research Assistant	Utah State University	1998-2000
Engineering Intern	Utah Dept. of Transportation	Summer 1998
Engineering Intern	Weber Basin Water District	Summer 1997
Youth Counselor	Brigham Young University	Summer 1996
City Facilities Maintenance	City of Morgan, UT	Summer 1995

## **RESEARCH AWARDS**

1. South Dakota Governor's Center Grant, "Composite and Nanocomposites Advanced Manufacturing (CNAM) Center," Salem (PI), Cross, Robinson, Fong, Hong, Hu, Du, Sereda, \$2,000,000, 2013-2018.
2. NASA Space Training Research Fellowship (Anthony Kulesa) Advisor Support, Robinson (PI), \$18,000, 2012-2013.
3. South Dakota EPSCoR, "Undergraduate Research Program for Underrepresented Students in Civil and Environmental Engineering," Robinson (PI), \$5,000, 2013.
4. NASA EPSCoR, "Structural Thermal Insulation Composites," Duke (PI), Salem (S-PI), Cross, Robinson, Koodali, Wang, \$750,000, 2011-2015.
5. Industry: EVAPCO, "Composite Action of Concrete-Filled FRP Tubes," Robinson (PI), \$4,500 (material donation), 2011.
6. South Dakota Space Grant, "VARTM Process Simulation for Compressible Preforms," Robinson (PI), \$18,000, 2010-2012.
7. ONR, subcontract from University of California, San Diego, "Composite Joint Assault Bridge (CJAB): Joint Design and Analysis," Robinson (PI), \$40,000, 2010.

## **RESERCH EXPERIENCE**

### **Assistant Professor, CEE Dept., South Dakota School of Mines**

- Optimization of structural thermal insulation composites for lunar habitation (NASA).
- Investigation of composite action of concrete-filled FRP tubes (EVAPCO).
- Investigation of impact response of aluminum foam cored composite panels (Army Research Laboratory, ARL).
- Bridge/vehicle interaction for light-weight bridging systems.

### **Postdoctoral Researcher, Dept. of Structural Engineering, U.C. San Diego**

- Development of light-weight infantry/vehicle bridging (Leonard Wood Institute, LWI)
- Design, analysis, and testing of highly loaded fiber reinforced polymer (FRP) composite/metallic bridge joints (ONR).

### **Graduate Research Assistant, Dept. of Structural Engineering, U.C. San Diego**

- Developed a finite element code for simulating the Vacuum Assisted Resin Transfer Molding (VARTM) process for the fabrication of composite structures (ONR).
- Developed test fixtures and procedures for characterizing composite preform properties required for simulating the VARTM process (ONR).
- Developed a composite roadway deck system for modular composite bridging and existing bridge repair (ONR).
- Developed light-weight, short-span, composite bridging for the US Army, consisting of full-scale laboratory testing as well as extensive field testing at Aberdeen Proving Grounds and 29 Palms Marine Base. Experimental work included strain data acquisition and dynamic analysis for a variety of wheeled and tracked vehicles as well as loading at extreme temperatures (Army TACOM/ONR).
- Full-scale lab testing of composite bridge components and joints including strain and acoustic emission data acquisition and analysis (Seemann Composite/Army TACOM).
- In-field manufacturing of composite structures (ONR).
- Implementation of damping material in composite structures fabricated using the VARTM process.

### Graduate Research Assistant, Dept. of Civil Engineering, Utah State University

- Performed a condition assessment of a six-span, full-scale bridge using forced vibrations. The condition assessment included instrumentation of the structure with an array of velocity transducers which were used to obtain the modal frequencies and mode shapes of the structure over an excitation range from 0.5 to 20 Hz with the excitation being produced using a rotating mass shaker. Data was collected and analyzed for four different damage states to assess the degree of damage (Federal Highway Administration, FHWA).

### TEACHING EXPERIENCE

#### South Dakota School of Mines and Technology IDEA Surveys (5 point scale)

Year/ Course	Course Title/Credit Hours	Excellent Teacher	Excellent Course
<b>2014</b>			
CEE 284	Numerical Methods (3 cr.)	4.6	4.5
CEE 655	Applied Composites (3 cr.)	5.0	4.9
<b>2013</b>			
CEE 457	Indeterminate Structures (3 cr.)	5.0	4.8
CEE 353	Theory of Structures (3 cr.)	4.7	4.5
CEE 657	Advanced Structural Analysis (3 cr.)	4.8	4.8
<b>2012</b>			
CEE 457	Introduction to Indeterminate Structures (3 cr.)	4.9	4.6
CEE 353	Theory of Structures (3 cr.)	4.8	4.6
CEE 655	Applied Composites (3 cr.)	4.7	4.8
<b>2011</b>			
CEE 457	Indeterminate Structures (3 cr.)	5.0	4.7
CEE 353	Theory of Structures (3 cr.)	4.6	4.5
CEE 656	Advanced Structural Analysis (2 cr. New prep)	4.6	4.6
CEE 656L	Advanced Structural Analysis Lab (1 cr. New prep)	4.6	4.7
<b>2010</b>			
CEE 457	Indeterminate Structures (3 cr. New prep)	4.8	4.6
CEE 353	Theory of Structures (3 cr.)	4.9	4.7
CEE 655	Applied Composites (2 cr. New prep)	4.3	4.2
CEE 655L	Applied Composites Lab (1 cr. New prep)	4.7	4.5
<b>2009</b>			
CEE 353	Theory of Structures (3 cr. New prep)	4.9	4.9
<b>AVERAGE</b>		<b>4.8/5.0</b>	<b>4.6/5.0</b>

## PUBLICATIONS

### Refereed Journal Papers

1. **Robinson, M. J.**, Melby, I. H.\* “Effects of Bonding in Short-Span Rectangular Concrete Filled FRP Tubes” (In preparation)
2. Kulesa, A. T.\*, **Robinson, M. J.** 2014. “Analytical Study of Structural Thermal Insulating Syntactic Foams” *Journal of Composite Structures*, <http://dx.doi.org/10.1016/j.compstruct.2014.09.025>
3. Robinson, M. J. and Kosmatka, J. B. 2014. “Analysis of the Post-filling Phase of the Vacuum Assisted Resin Transfer Molding Process” *Journal of Composite Materials*, 48(13) pp. 1547-1559.
4. Belzer, B. E., **Robinson, M. J.**, and Fick, D. R. 2013. “Composite Action of Concrete-filled Rectangular GFRP Tubes” *Journal of Composites for Construction*, 17(5) pp.722-731.
5. **Robinson, M. J.** and Kosmatka, J. B. 2011. “Experimental Dynamic Response of a Short-Span Composite Bridge to Military Vehicles” *Journal of Bridge Engineering*, 16(1) pp.166-170.
6. Kai, H. H., Halling, M. W., Barr, P. J., and **Robinson, M. J.** 2008. “Structural Damage Detection Using Dynamic Properties Determined from Laboratory and Field Testing” *Journal of Performance of Constructed Facilities*, 22(4) pp. 238-244.
7. **Robinson, M. J.** and Kosmatka, J. B. 2008. “Development of a Short-Span Fiber-Reinforced Composite Bridge for Emergency Response and Military Applications” *Journal of Bridge Engineering*, 13(4) pp. 388-397.
8. **Robinson, M. J.** and Kosmatka, J. B. 2008. “Light-Weight Fiber-Reinforced Polymer Composite Deck Panels for Extreme Applications” *Journal of Composites for Construction*, 12(3) pp. 344-354.
9. **Robinson, M. J.** and Kosmatka, J. B. 2006. “Improved Damping in VARTM Composite Structures using Perforated Viscoelastic Layers” *Journal of Composite Materials*, 40(23) pp. 2157-2173.

### Peer Reviewed Conference Proceedings

1. Kulesa, A. T. and **Robinson, M. J.** 2014 “Analytical Study of Mechanical Properties of Syntactic Foams” *Proceedings of SAMPE 2014*, Seattle, WA, June 2104.
2. Kulesa, A. T., **Robinson, M. J.**, Salem, D., and Cross, W. 2013, “Analytical Study of Thermal and Mechanical Properties of Syntactic foams for Space Applications” *International Aeronautics Congress 2013*, Beijing China, Sept. 2013.
3. Ducheneaux, T., **Robinson, M. J.**, Salem, D., Kjerengtroen, L., and French S. 2013. “Impact Performance of Composite Sandwich Structures with Aluminum Foam Cores” *Proceedings of SAMPE 2013*, Long Beach, CA, May 2013.
4. **Robinson, M. J.** and Kosmatka, J. B. 2012. “Performance of Highly Loaded Bonded, Bolted, and Bonded/Bolted Composite/Metallic Joints” *Proceedings of AIAA 2012*, Waikiki, HI, April 2012.
5. **Robinson, M. J.** and Kosmatka, J. B. 2011. “Dynamic Response of a Light-Weight Composite Bridge” *Proceedings of EURO DYN 2011*, Leuven, Belgium, July 2011.
6. **Robinson, M. J.** and Kulesa, A. T. 2011. “Laminate Thickness Analysis for the Vacuum Bag Resin Transfer Molding Process” *Proceedings of SAMPE 2011*, Long Beach, CA, May 2011.
7. **Robinson, M. J.** and Kosmatka, J. B. 2010. “Experimental Permeability and Compaction Measurements using the VARTM Process”. *Proceedings of SAMPE 2010*, Seattle, WA, May 2010.

8. **Robinson, M. J.** and Kosmatka, J. B. 2010. "Dynamic Load Factors for a Short-span Composite Bridge", *ICCE-18 Conference*, Anchorage, AK, July 2010.
9. Kosmatka, J. B. and **Robinson M. J.** 2010. "Composite Bridging for Military and Emergency Applications", *ICCE-18 Conference*, Anchorage, AK, July 2010.
10. **Robinson, M. J.**, and Kosmatka, J. B. 2008. "Resin Bleeding Simulation for the VARTM Process", *Proceedings of SAMPE 2008, Long Beach, California*, (cd-rom) 15 pages.
11. **Robinson, M. J.**, and Kosmatka, J. B. 2008. "Vacuum Assisted Resin Transfer Molding Simulation for Thick Laminate Structures" *Proceedings of the 49<sup>th</sup> AIAA/ASME/ASCE/AHS/ASC Structures, Structural Dynamics, and Materials Conference*, Chicago, IL, April 2010.
12. Velazquez, E., Klein, D. J., **Robinson, M. J.**, and Kosmatka, J. B. 2008. "Acoustic Emissions (AE) Monitoring of Large-scale Composite Bridge Components" *SPIE Proceedings on Smart Structures and Materials*.
13. **Robinson, M. J.** and Kosmatka, J. B. 2006. "An Alternative Method for Measuring Permeability for the VARTM Process" *Proceedings of SAMPE 2006, Long Beach, California*, (cd-rom) 15 pages.
14. **Robinson, M. J.** and Kosmatka, J. B. 2005. "Low-Cost VARTM Processing of Thin Laminate Composites with Embedded Impervious Layers" *Proceedings of SAMPE 2005, Long Beach California*, (cd-rom) 14 pages.
15. **Robinson, M. J.** and Kosmatka, J. B. 2005. "Embedding Viscoelastic Damping Materials in Low-Cost VARTM Composite Structures" *SPIE Proceedings on Smart Structures and Materials*, 5760, pp 349-360.
16. **Robinson, M. J.**, Halling, M. W., and Womack, K. C. 2000. "Condition Assessment of a Six-span Full-scale Bridge Using Forced Vibration" *SPIE Proceedings on Smart Structures and Materials*, 3995, pp 404-413.

### **Technical Reports**

1. **Robinson, M. J.** and Kosmatka, J. B. 2009 "Rapidly Deployable Composite Bridge Structures" final report submitted to the Office of Naval Research under Contract No. N00014-05-C-0053, UCSD SSRP-2009/10.
2. Kosmatka, J. B. and **Robinson, M. J.** 2007 "Rapidly Deployable Composite Bridge Project: ONR 1-4 m Bridge" final report submitted to the Office of Naval Research, UCSD Dept. of Structural Engineering.
3. **Robinson M. J.**, Stravidis, A., Kosmatka, J. B., and Ashford, S. A. 2004. "Rapidly Deployable Composite Bridge Project" final report submitted to the Office of Naval Research under Contract No. N00014-02-C-0374, UCSD SSRP-04/07.

### **PRESENTATIONS (\*Student Presenter)**

1. Robinson, Belzer, Melby, "Effects of Concrete/Tube bonding in Concrete-filled FRP Tubes" MECOMP 2014, Stony Brook University, June 2014.
2. \*Anthony Kulesa, Robinson, "Analytical Study of Structural and Thermal Insulating Syntactic Foams" MECOMP, Stony Brook University, June 2014.
3. \*Anthony Kulesa, Robinson, (presented by Eric Schmidt), "Analytical Study of Mechanical Properties of Syntactic Foams" SAMPE 2014, Seattle, WA, June 2014.
4. "Research Interests and Capabilities," NASA Kennedy Space Center, April 17, 2014.
5. "Research Interests and Capabilities," NASA Langley Research Center, March 31, 2014.

6. \*Anthony Kulesa, Robinson, Salem, Cross, "Analytical Study of Thermal and Mechanical Properties of Syntactic foams for Space Applications" International Aeronautics Congress 2013, Beijing China, Sept. 2013.
7. "Impact Performance of Composite Sandwich Structures with Aluminum Foam Cores" SAMPE 2013, Long Beach, CA, May 2013.
8. "Performance of Highly Loaded Bonded, Bolted, and Bonded/Bolted Composite/Metallic Joints" AIAA, Waikiki, HI, April 2012.
9. "Impact Performance of Composite Sandwich Structures with Aluminum Foam Cores" SAMPE 2013, Long Beach, CA, May 2011.
10. "Dynamic Response of a Light-Weight Composite Bridge" EUROODYN, Leuven, Belgium July 2011.
11. "Lunar Habitation: Why, Where, How?" South Dakota Engineers Society Awards Banquet, Rapid City, SD, Feb. 2011.
12. "Advanced Materials for Lunar Habitats: Who? Why? Where? and How?" Graduate Seminar, CEE SDSM&T, Oct. 2011.
13. "Development of Light-Weight Low-Cost Structures: Processing, Design, Analysis, and Testing" SDSM&T Research Opportunities (Dr. Sonnefeld, Clemson), SDSM&T Feb. 2011.
14. "Experimental Permeability and Compaction Measurements using the VARTM Process". Proceedings of SAMPE (Seattle, WA) May 2010.
15. "VARTM Processing and Simulation: Research Interests" NASA Kennedy Space Center, Nov. 8, 2010.
16. "Dynamic Load Factors for a Short-span Composite Bridge", ICCE-18 Conference (Anchorage, AK) July 2010.
17. "Development of Light-Weight Composite Bridging: Processing Design Analysis and Testing", South Dakota School of Mines and Tech., ASCE Student Chapter, Nov. 2009.
18. "Simulation of Composite Processing (VARTM) and the Development of Light-Weight Composite Bridging", University of Houston, April 2009.
19. "Simulation of Composite Processing (VARTM) and the Development of Light-Weight Composite Bridging", South Dakota School of Mines and Tech., March 2009.
20. "Resin Bleeding Simulation for the VARTM Process" SAMPE, Long Beach, 2008.
21. "Vacuum Assisted Resin Transfer Molding Simulation for Thick Laminate Structures" 49<sup>th</sup> AIAA/ASME/ASCE/AHS/ASC Structures, Structural Dynamics, and Materials Conference, Chicago Illinois, 2008.
22. "Advanced In-Field Manufacturing of Composite Military Bridging Structures" Office of Naval Research Technical Review, San Diego, CA, April 2007.
23. "The Development of Composite Modular Bridging" Structural Engineering Seminar, University of California, San Diego, Oct. 2006.
24. "An Alternative Method for Measuring Permeability for the VARTM Process" SAMPE Conference, Long Beach California, 2006.
25. "Low-Cost VARTM Processing of Thin Laminate Composites with Embedded Impervious Layers" SAMPE Conference, Long Beach, California, 2005.
26. "Embedding Viscoelastic Damping Materials in Low-Cost VARTM Composite Structures" SPIE Smart Structures and Materials, San Diego, California, 2005.
27. "Design and Development of a 1.5 to 4 Meter Gap Defending System for PLS Truck/Trailer and MLC-30 Tracked Vehicles" US Army TACOM, Warren MI, 2004.
28. "Condition Assessment of a Six-span Full-scale Bridge Using Forced Vibration" SPIE Smart Structures and Materials, Newport Beach, CA, 2000.

**ADVISING****M.S. Thesis Students Advised**

<b>Student Name</b>	<b>Thesis Title</b>	<b>Graduation</b>
Tyler Adams (CEE)	Applications of Light-Weight Styrofoam Filled Concrete	2015
Anthony Kulesa (CEE)	Structural Thermal Insulation Composites (NASA) (Advisor)	2014 (Completed)
Ivar Melby (CEE)	Shear Response of Concrete-Filled Fiber Reinforced Polymer (FRP) Tubes (Advisor)	2013 (Completed)
Brett Belzer (CEE)	Rectangular Concrete-Filled Pultruded Glass Fiber Reinforced Polymer Tubes for Structural Applications (Advisor)	2012 (Completed)
Adam Kilzer (ME)	Through-Thermographic Evaluation of Composite Bond Joints: Modeling and Application of Thermal-Response Imaging for the Detection of Bond Joint Defects (Co-Advisor)	2012 (Completed)
Travis Ducheneaux (ME)	Investigation of Low Velocity Impact on Composite Sandwich Structures (Co-Advisor)	2012 (Completed)

**M.S. Project Students Advised**

<b>Student Name</b>	<b>Thesis Title</b>	<b>Graduation</b>
SK Awal (CEE)	Experimental Investigation of Confinement Effects on Concrete-Filled Fiber Reinforced Polymer Tubes (Square) under Axial Loading (Advisor)	2011 (Completed)

**Undergraduate Research Assistants**

<b>Student Name</b>	<b>Thesis Title</b>	<b>Graduation</b>
Tyler Adams (CEE)	Shear Response of Concrete-Filled Fiber Reinforced Polymer (FRP) Tubes	2014 (Completed)
Ivar Melby (CEE)	Composite preform permeability measurements using a low flow meter.	2011 (Completed)
Anthony Kulesa (CEE)	Compaction Response of Fiber Preforms	2011 (Completed)
Travis Duchenaux (ME)	FE modeling of hybrid metallic/FRP composite joints	2010 (Completed)

**UNDERGRADUATE RESEARCH STUDENTS SUPERVISED**

Sean Wisotzkey	UCSD	Composite Bridging	2009
Jose Aceituno	UCSD	Composite Bridging	2009
Brittney Rumley	UCSD	Composite Bridging	2009
Allen Rameriz	UCSD	Composite Bridging	2009
Anthony Davidson	UCSD	Composite Bridging	2009
Bryan McDonald	UCSD	Composite Bridging	2008
Daniel Bedenko	UCSD	Composite Bridging	2008
Quang Tran	UCSD	Composite Bridging	2007
Kevin Klein	UCSD	Composite Bridging	2006

Wen Hsu	UCSD	Composite Bridging	2005
Miran Nersissian	UCSD	Composite Bridging	2005
Kevin Palmer	UCSD	Composite Bridging	2004
Dawn McGafee	UCSD	Composite Bridging	2003

### **CONSULTING**

Blue Mountain Energy	Equipment Risk Analysis	2013
Seemann Composites Inc.	Advanced Modular Composite Bridge	2006-2009
NAVFAC Port Hueneme	Sheave Buckling Analysis	2008
Residential Plan Reviewer	Private Residence	2007

### **HONORS AND AWARDS**

- William V. Coyle Professorship of Civil and Environmental Engineering 2014-2015
- ASCE Steel Bridge Outstanding CAMP Advisor Award 2010-2011 (Center for Advanced Manufacturing and Production)
- Selected to attend the Pan American Advanced Studies Institute in Damage Prognosis, Florianopolis, Brazil, 2003.
- ASCE Steel Bridge Competition, 1<sup>st</sup> place at regional competition and 4<sup>th</sup> place at national competition 1998.

### **PROFESSIONAL AFFILIATIONS**

- American Society of Civil Engineers (ASCE)
- Society for the Advancement of Material and Process Engineering (SAMPE)
- American Institute of Aeronautics and Astronautics (AIAA)
- South Dakota Wind Energy Association (SDWEA)

### **PROFESSIONAL SERVICE**

- Scientific Committee Member of MECHCOMP, Stony Brook University 2014.
- Session Co-Chair-International Conference on Composites/Nano Engineering. Anchorage, AK 2010.
- Reviewer: ASCE Journal of Bridge Engineering (2 reviews), ASCE Composites for Construction (1 review), Composite Structures (1 review)

### **UNIVERSITY SERVICE**

- CEE Undergraduate Research Coordinator (2011-present)
- CEE Graduate Education Council (2011-present)
- CEE Faculty Search Committee (2011/2012)
- CEE Dept. Head Search Committee (2009/2010)
- ME Faculty Search Committee (2009/2010)
- CEE Faculty Search Committee (2010/2011)
- CEE ABET Preparation Committee (2009-present)
- CEE Scholarship/Fellowship Selection Committee (Chair 2010)
- E-Week Planning Committee (2010/2011)
- Provost Advisory Council for Faculty Development (2010-present)
- Recruitment: Visit Mines 2009-present

### **SERVICE TO COMMUNITY**

- Boy Scouts of America, Volunteer Leader (2005-present)
- K-12 Civil Engineering Presentations (yearly 2010-present)