

Evgueni T. Filipov, Ph.D.

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PROFESSIONAL PREPARATION

University of Illinois at Urbana-Champaign (UIUC)	Urbana, IL	Civil Engineering	Ph.D.	2016
University of Illinois at Urbana-Champaign	Urbana, IL	Civil Engineering	M.S.	2012
Rensselaer Polytechnic Institute (RPI)	Troy, NY	Civil Engineering	B.S.	2009

APPOINTMENTS

2017-Present: Assistant Professor - Civil and Environmental Engineering - University of Michigan, Ann Arbor, MI

Affiliate Faculty: *Michigan Institute for Computational Discovery and Engr. (MICDE), Michigan Materials Research Institute (MMRI), and Graham Sustainability Institute*

2009-2016: Graduate Research Assistant/Teaching Assistant - Civil and Environmental Engineering - University of Illinois at Urbana-Champaign, Urbana, IL

Spring 2014: Visiting Scholar and NSF GRFP/GROW Fellow - University of Tokyo

Fall 2013: Course Instructor - Civil and Environmental Engineering - University of Illinois at Urbana-Champaign, Urbana, IL

SELECTED AWARDS AND HONORS

NSF CAREER Award	2020
UM Nominee for David and Lucile Packard Fellowship for Science and Engineering	2019
DARPA 2018 Young Faculty Award	2018
UM Nominee for Gordon and Betty Moore Foundation Inventors Fellowship	2018
ZF Automotive Award	2018
ASCE Excellence in Civil Engineering Education (ExCEED) Fellowship	2017
Cozzarelli Prize - National Academy of Sciences	2015
National Science Foundation - Grad Research Opportunities Worldwide (GROW) Fellow	2014
Japanese Society for the Promotion of Science (JSPS) - Visiting Scholar Fellowship	2014
National Science Foundation - Graduate Research Fellowship Program (GRFP)	2010-2015
Mavis Future Faculty Fellows Award, UIUC (Awarded Twice)	2012 & 2013
Structural Engineers Foundation Scholarship, Chicago, IL	2010-2011
Page Fellowship, Karol Fellowship and Sargent & Lundy Fellowship, UIUC	2009-2010
Howard N. Blitman P.E. Patroon Scholar, RPI	2005-2009
Alumni Scholarship, RPI	2005-2009

RESEARCH INTERESTS

My research interests lie in the field of *deployable, reconfigurable, and adaptable structures*. Folding and adaptable structures based on the principles of origami can have practical applications ranging in scale and discipline from biomedical robotics to deployable architecture. I am interested in exploring the *fundamental mechanics of these thin sheet systems* and creating *analytical tools* that can simulate mechanical and multi-physical phenomena in such structures. The analytical models incorporate folding kinematics along with various local and global phenomenological models. Understanding how the geometry affects stiffness and other properties can allow for the optimization and discovery of new reconfigurable and adaptable systems. My research also deals with the design and manufacturing of deployable structures using 3D printing and other fabrication techniques. At micro-scales, my lab uses active materials and layered bimorphs to achieve folding and create three dimensional structures. We use multi-material additive manufacturing in intermediate scales to create cellular metamaterials with unique and adaptable characteristics (e.g. high stiffness-weight ratios and variable thermal conductivity). My lab is also exploring large-scale folding systems where thick panels are connected with hinges, and are deployed by mechanical devices.

FUNDING PORTFOLIO

1. **Office of Naval Research.** “Rapid Assembly of Continuous Surfaces by Adhesion of Curved Crease Origami,” \$120,000, Jan. 2021 – Dec. 2021, **Principal Investigator:** Evgueni Filipov.
2. **National Science Foundation CAREER Award.** “Large, Deployable and Adaptable Structures Through Origami Engineering,” \$603,549, May 2020 – April 2025, **Principal Investigator:** Evgueni Filipov,
3. **Defense Advanced Research Projects Agency (DARPA) - 2018 Young Faculty Award.** “Functional Small-Scale Actuation with Origami Inspired Assemblages,” \$494,834, July 2018 – June 2020, **Principal Investigator:** Evgueni Filipov, **Subcontracted Investigator:** Kenn Oldham.
4. **University of Michigan MCubed Program** – “Deployable and Adaptable Tensegrity Structures from Knitted Origami,” \$60,000, Jan. 2019 – Dec. 2020, **Principal Investigator:** Evgueni Filipov; **co-PIs** Jeff Scruggs and Sean Ahlquist.
5. **Office of Naval Research.** “Curved folded sheets for stiff, anisotropic, and adaptable structures,” \$322,181, Jan. 2018 – Dec. 2020, **Principal Investigator:** Evgueni Filipov.
6. **ZF Group - 2018 ZF Automotive Award,** “Energy Dissipation in Cellular Origami: From Passive to Active Crash Protection,” \$35,000, Jan. 2018 – Dec. 2018, **Principal Investigator:** Evgueni Filipov.

PUBLICATIONS AND PRESENTATIONS

Refereed Papers in Journals (Supervised students underlined)

1. Zhu, Y., Birla, M., Oldham, K., Filipov, E.T., (2020) “Elastically and Plastically Foldable Electro-Thermal Micro-Origami for Controllable and Rapid Shape Morphing” *Advanced Functional Materials*, Vol.30, No.40, pp. 2003741.

2. Woodruff, S.,R., and Filipov, E.T. (2020) “A bar and hinge model formulation for structural analysis of curved-crease origami”, *International Journal of Solids and Structures*, Vol.204-205, pp. 114-127.
3. Woodruff SR, Filipov ET (2020) “Curved creases redistribute global bending stiffness in corrugations: theory and experimentation,” *Meccanica* <https://doi.org/10.1007/s11012-020-01200-7>
4. Zhu, Y. and Filipov, E.T. (2020) “A Bar and Hinge Model for Simulating Bistability in Origami Structures with Compliant Creases” *Journal of Mechanisms and Robotics*, Vol. 12, No. 2, pp. 021110.
5. Zhu, Y. and Filipov, E.T. (2019) “An Efficient Numerical Approach for Simulating Contact in Origami Assemblages,” *Proceedings of the Royal Society – A*, Vol 475, No. 2230, pp. 2019.0366.
6. Filipov, E.T., and Redoutey, M. (2018) “Mechanical characteristics of the bistable origami hyperpar,” *Extreme Mechanics Letters*, Vol 25, pp. 16-26.
7. Filipov, E.T., Tachi, T., and Paulino, G.H. (2019) “Deployable sandwich surfaces with high out-of-plane stiffness,” *Journal of Structural Engineering*, Vol. 145, No. 20, pp. 04018244. **Awarded 2019 Best Journal Paper in the Analysis and Computation category**
8. Filipov, E.T., Liu, K., Tachi, T., Schenk, M., and Paulino, G.H. (2017) “Bar and Hinge models for Scalable Analysis of Origami,” *International Journal of Solids and Structures*, Vol. 124, No. 1, pp. 26-45.
9. Filipov, E.T., Paulino, G.H., and Tachi, T. (2016) “Origami Tubes with Reconfigurable Polygonal Cross-Sections,” *Proceedings of the Royal Society – A*, Vol. 472, No. 2185, 20150607.
10. Filipov, E.T., Tachi, T., and Paulino, G.H. (2015) “Origami Tubes Assembled Into Stiff, yet Reconfigurable Structures and Metamaterials,” *Proceedings of the National Academy of Sciences USA*, Vol. 112, No. 40, pp. 12321-12326. **Awarded Cozzarelli Prize**. Highlighted in [PNAS commentary by Reis et al. 2015](#). Reported by: [WXYZ TV – ABC News](#), [The Wall Street Journal](#), [Civil + Structural Engineer](#), [Discovery News](#), [Motherboard](#), [City Lab](#), [Fast Company](#), [Gizmag](#), [Phys.org](#), [Science Daily](#), [Space Daily](#), [Gizmodo](#), [Sydney Morning Herald](#), and [more](#).
11. Filipov, E.T.*, Chun, J.*, Paulino, G.H., and Song, J. (2015) “Polygonal Multiresolution Topology Optimization (PolyMTOPT) for Structural Dynamics,” *Structural and Multidisciplinary Optimization*, Vol. 53, No. 4, pp. 673-694 * Equal contribution authors.
12. O’Rourke, M.J., Filipov, E.T., and Uçkan, E. (2015). “Towards Robust Fragility Relations for Buried Segmented Pipe in Ground Strain Areas,” *Earthquake Spectra*, Vol. 31, No. 3, pp. 1839-1858.
13. Steelman, J.S., Filipov, E.T., Fahnestock, L.A., Revell, J.R., LaFave, J.M., Hajjar, J.F., and Foutch, D.A. (2014). “Experimental Behavior of Steel Fixed Bearings and Implications for Seismic Bridge Response,” *Journal of Bridge Engineering*, Vol. 19, No. 8, SPECIAL ISSUE: Recent Advances in Seismic Design, Analysis, and Protection of Highway Bridges, A4014007.
14. Filipov, E.T., Revell J.R., Fahnestock L.A., LaFave J.M., Hajjar, J.F., Foutch D.A., and Steelman J.S. (2013). “Seismic Performance of Highway Bridges with Fusing Bearing Components for Quasi-Isolation,” *Earthquake Engineering and Structural Dynamics*. Vol. 42, No. 9, pp. 1375-1394.

15. Filipov, E.T., Fahnestock L.A., Steelman J.S., Hajjar, J.F., LaFave J.M., and Foutch D.A. (2013). "Evaluation of Quasi-Isolated Seismic Bridge Behavior Using Nonlinear Bearing Models," *Engineering Structures*, Vol. 49, No. 14, pp. 168-181.
16. Steelman, J.S., Fahnestock L.A., Filipov E.T., LaFave J.M., Hajjar, J.F., and Foutch D.A. (2013). "Shear and Friction Response of Non-Seismic Laminated Elastomeric Bridge Bearings Subject to Seismic Demands," *Journal of Bridge Engineering*, Vol. 18, No. 7, pp. 612-623.

Book Chapters and Technical Reports

1. Filipov, E.T., Tachi, T., and Paulino, G.H. (2016). "Toward Optimization of Stiffness and Flexibility of Rigid, Flat-Foldable Origami Structures," *Origami⁶* pp. 409-419, American Mathematical Society, Providence, RI.
2. LaFave, J.M., Fahnestock, L.A., Foutch, D.A., Steelman, J.S., Revell, J.R., Filipov, E.T., and Hajjar, J.F. (2013). *Experimental Investigation of the Seismic Response of Bridge Bearings*, Report No. FHWA-ICT-13-002. Illinois Center for Transportation, Springfield, IL.
3. LaFave, J.M., Fahnestock, L.A., Foutch, D.A., Steelman, J.S., Revell, J.R., Filipov, E.T., and Hajjar, J.F. (2013). *Seismic Performance of Quasi-Isolated Highway Bridges in Illinois*, Report No. FHWA-ICT-13-015. Illinois Center for Transportation, Springfield, IL.

Patent Applications

1. Filipov, E.T., Tachi, T., Yamaguchi, Y., and Paulino, G.H. (2015). "Foldable Structures and their Manufacturing Method, Manufacturing Device and Program," Japanese Patent No. WO2017030103 A1, *filed* August 12, 2016, *published* February 23, 2017. International Patent PCT application number 15/896,519 *filed* February 14, 2018.

Conference Proceedings and Presentations (Supervised students underlined)

1. Xia, Y., Filipov, E.T., Wang, K.W., (2021) "The deployment dynamics and multistability of tubular fluidic origami" *SPIE Smart Structures and Nondestructive Evaluation*, Digital Forum, March 22-26, 2021. **Finalist for 2021 SPIE Best Student Paper Award.**
2. Ng, T., Ahlquist, S., Filipov, E.T., Weisman, T. (2020) "Active-Casting: Functionally Graded Knits for Volumetric Concrete Casting" *ACADIA 2020*, Distributed Proximity, 2020. (in review)
3. Zhou, M., Kang, D.H., Zhu, Y., Filipov, E.T., Kim, J., and Weiland, J. (2020) "Shape Morphable Hydrogel/Elastomer Bilayer for Implanted Retinal Electronics" *2020 Virtual MRS Spring/Fall Meeting & Exhibit*, November 27 - December 4, 2020.
4. Zhu, Y., Birla, M., Oldham, K.R., and Filipov, E.T. (2020) "Design and Fabrication of Functional Electro-Thermal Micro-Origami,"- *International Mechanical Engineering Congress & Exposition, Virtual Conference Online*, November 16-19, 2020.
5. Filipov, E.T., Zhu, Y., Birla, M., and Oldham, K.R. (2020) "A Simulation Framework for the Design and Fabrication of Functional Micro-Origami,"- *International Mechanical Engineering Congress & Exposition, Virtual Conference Online*, November 16-19, 2020.
6. Filipov, E.T., and Woodruff S.R. (2020) "Curved Creases Enhance the Bending Rigidity of Folded Sheets,"- Invited Live Lecture – *Society of Engineering Science 2020 Virtual Technical Meeting*, September 29 - October 1, 2020.
7. Zhu, Y., and Filipov, E.T. (2020) "Modelling Origami Self-Contact for Functional Micro-Origami,"- *Society of Engineering Science 2020 Virtual Technical Meeting*, September 29 - October 1, 2020.

8. Woodruff S.R., and Filipov E.T. (2020) "Curved-crease origami with multi-directional stiffness", *Online Presentation in Substitution for ASCE Engineering Mechanics Institute - International Conference*, April 8, 2020.
9. Filipov, E.T., and Zhu, Y. (2019) "Simulating Contact in Deformable Origami Structures,"- KEYNOTE LECTURE – *Society of Engineering Science 2019 Technical Meeting*, October 13-15, 2019, Washington University in St. Louis, St. Louis, MO.
10. Wang, B., Redoutey, M., Chen, C.Q., and Filipov, E.T. (2019) "A tubular origami design for programmable, functional and packable robotic structures," *Society of Engineering Science 2019 Technical Meeting*, October 13-15, 2019, Washington University in St. Louis, St. Louis, MO.
11. Sychterz, A., and Filipov, E.,T., (2019) "Actuator optimization for adaptive origami structures," *Society of Engineering Science 2019 Technical Meeting*, October 13-15, 2019, Washington University in St. Louis, St. Louis, MO.
12. Redoutey, M., Ahlquist, S., Shaw, J., Filipov, E.T., (2019) "Bending active structures with a variable cross-section boundary," *IASS Annual Symposium 2019*, Barcelona, Spain
13. Zhu, Y., and Filipov, E.T., (2019) "Simulating Compliant Crease Origami with a Bar and Hinge Model," *ASME IDET Conference*, V05BT07A025, Anaheim CA.
14. Filipov, E.T., Tachi, T., Paulino, G.H., (2019) "Coupled Origami Tubes For Stiff Deployable Cantilevers," *ASME IDET Conference*, V05BT07A023, Anaheim CA.
15. Filipov E.T., and Wo Z. (2019) "Crushing of origami tubes for tunable energy absorption," *ASCE Engineering Mechanics Institute Conference*, June 18-21, 2019 Pasadena, CA.
16. Woodruff S.R. and Filipov E.T. "Functional anisotropy: exploiting the mechanics of curved-creased origami systems," *ASCE Engineering Mechanics Institute Conference*, June 18-21, 2019 Pasadena, CA.
17. Filipov E.T., Woodruff, S.R., (2019) "Mechanics and Dynamics of Reconfigurable Curved Creased Origami Arrays," *Acoustical Society of America Annual Meeting*, Louisville, KY May 13, 2019.
18. Wo, Z., Raneses, J., and Filipov E.T., (2019) "Using tunable origami for active energy absorption," *Bulletin of the American Physical Society*, March 4-8, Boston, MA.
19. Filipov E.T., Woodruff, S., (2019) "Exploring the mechanics of curved creased origami with a discrete bar and hinge," *Bulletin of the American Physical Society*, March 4-8, Boston, MA.
20. Filipov, E.T., Liu, K., Tachi, T., Schenk, M., and Paulino, G.H. (2018) "Simulating Origami Facet Bending with a N5B8 Bar and Hinge Model," *7OSME – 7th Conference on Origami Science, Mathematics, and Engineering*, September 5-7, 2018, Oxford, UK.
21. Paulino, G.H., Filipov, E.T., and Tachi, T. (2018) "Coupled Origami Tubes for Stiff Deployable Structures," *7OSME – 7th Conference on Origami Science, Mathematics, and Engineering*, September 5-7, 2018, Oxford, UK.
22. Wo, Z., Filipov, E.T., "Geometric Implications for Stress Concentration in Miura Origami" 13th World Congress on Computational Mechanics / 2nd Pan American Congress on Computational Mechanics (WCCM 2018) July 22-27, New York, NY. ***Student Poster Competition Nominee.***
23. Redoutey, M., Filipov E.T. (2018) "Mechanical Characteristics of Origami Hypars," *ASCE Engineering Mechanics Institute Conference*, May 29 - June 1, 2018 Cambridge, MA.
24. Filipov, E.T., Woodruff S. R. (2018) "The Mechanics of Folding Curved Crease Origami," *ASCE Engineering Mechanics Institute Conference*, May 29 - June 1, 2018 Cambridge, MA.

25. Woodruff S. R., Filipov, E.T. (2018) “Structural Analysis of Curved Folded Deployables,” *ASCE Earth and Space Conference*, April 9-12, 2018, Cleveland, OH. ***Student Paper Competition Finalist***.
26. Filipov E.T., Redoutey, M., (2018) “Mechanical Instabilities in the Origami Hypar,” *Bulletin of the American Physical Society*, March 5-9, Los Angeles CA.
27. Filipov, E.T., Liu, K., Tachi, T., Schenk, M., and Paulino, G.H. (2017) “A Bar and Hinge Model for Scalable Analysis of Origami Structures and Metamaterials,” *Society of Engineering Science 2017 Technical Meeting*, July 25-28, 2017, Northeastern University, Boston, MA.
28. Paulino, G.H., Filipov, E.T., and Tachi, T. (2017) “Tubular Origami Assemblages with Tunable Properties,” *Society of Engineering Science 2017 Technical Meeting*, July 25-28, 2017, Northeastern University, Boston, MA.
29. Filipov, E.T., Paulino, G.H., and Tachi, T. (2017) “Origami Tubes Coupled into Reconfigurable Structures and Metamaterials,” *ASCE Engineering Mechanics Institute Conference*, June 5-7, 2017, San Diego, CA.
30. Paulino, G.H., Filipov, E.T., and Tachi, T. (2017) “Tubular Origami Assemblages with Tunable Properties,” *ASCE Engineering Mechanics Institute - International Conference*, March 19-22, 2017, Rio de Janeiro, Brazil.
31. Filipov, E.T., Liu, K., Tachi, T., Schenk, M., and Paulino, G.H. (2017) “A Bar and Hinge Model for Scalable Analysis of Thin Origami,” *ASCE Engineering Mechanics Institute - International Conference*, March 19-22, 2017, Rio de Janeiro, Brazil.
32. Filipov, E.T., Paulino, G.H., and Tachi, T. (2015). “Flexible Origami Sheets Assembled into Stiff Reconfigurable Structures,” *Society of Engineering Sciences 2015 Technical Meeting*, October 26-28, 2015, College Station, TX.
33. Filipov, E.T., Paulino, G.H., and Tachi, T. (2015). “Reconfiguring Origami Tubes with Polygonal Cross-Sections,” *Society of Engineering Sciences 2015 Technical Meeting*, October 26-28, 2015, College Station, TX.
34. Tachi, T., Filipov, E.T., and Paulino, G.H. (2015). “Deployable Folded-core Sandwich Panels Guided by a Generating Surface,” *Proceedings of the International Association for Shell and Spatial Structures (IASS)*, August 17-20, 2015, Amsterdam, Netherlands.
35. Filipov, E.T., Paulino, G.H., and Tachi, T. (2015). “Miura Tubes and Assemblages: Theory and Applications,” *American Physical Society March Meeting*, March 2-6, 2015, San Antonio, TX.
36. Filipov, E.T., Tachi, T., and Paulino, G.H. (2014). “Toward Optimization of Stiffness and Flexibility of Rigid, Flat-Foldable Origami Structures,” *The 6th International Meeting on Origami in Science, Mathematics and Education (6OSME)*, August 10-13, 2014, Tokyo, Japan.
37. Filipov, E.T., Chun, J., Paulino, G.H., and Song, J. (2013). “Topology Optimization for Structural Dynamics: A Polygonal Multiresolution Approach,” *Engineering Mechanics Institute (EMI) Conference*, August 4-7, 2013, Evanston, IL.
38. Filipov, E.T., Chun, J., Paulino, G.H., and Song, J. (2013). “Polygonal Multiresolution Topology Optimization for Structural Dynamics,” *World Congress on Structural and Multidisciplinary Optimization (WCSMO)*, May 20-24, 2013, Orlando, FL.
39. Steelman, J.S., Filipov, E.T., Revell, J.R., LaFave, J.M., Fahnestock, L.A., Hajjar, J.F., and Foutch, D.A. (2013). “Achieving Bridge Resilience through Economical Seismic ‘Quasi-Isolation’ Design using Common Bearing Components,” *Proceedings of 7th National Seismic Conference on Bridges & Highways*, May 20-22, 2013, Oakland, CA.

40. Filipov, E.T., Revell, J.R., Steelman, J.S., Fahnestock, L.A., LaFave, J.M., Foutch, D.A., and Hajjar, J.F. (2012). "Sensitivity of Quasi-Isolated Bridge Seismic Response to Variations in Bearing and Backwall Elements," Paper No. 2978, *Proceedings of the 15th World Conference on Earthquake Engineering*, September 24-28, 2012, Lisbon, Portugal.
41. Filipov, E.T., Hajjar, J.F., Steelman J.S., Fahnestock L.A., LaFave J.M., and Foutch D.A. (2011). "Computational Analyses of Quasi-Isolated Bridges with Fusing Bearing Components," Paper No. 768, *Proceedings of the ASCE/SEI Structures Congress*, April 14-16, 2011, Las Vegas, NV.
42. Steelman J.S., Fahnestock L.A., LaFave J.M., Hajjar, J.F., Filipov, E.T., and Foutch D.A. (2011). "Seismic Response of Bearings for Quasi-Isolated Bridges – Testing and Component Modeling," Paper No. 855, *Proceedings of the ASCE/SEI Structures Congress*, April 14-16, 2011, Las Vegas, NV.
43. Filipov, E.T., Steelman J.S., Hajjar, J.F., LaFave J.M., and Fahnestock L.A. (2010). "Bridge Bearing Fuse Systems for Regions with High-Magnitude Earthquakes at Long Recurrence Intervals," Paper No. 1834, *Proceedings of the 9th US National and 10th Canadian Conference on Earthquake Engineering*, July 25-29, 2010, Toronto, Canada.

Invited Lectures

1. "Using Origami to Make Deployable and Adaptable Structures at Multiple Scales" Technische Hochschule Ostwestfalen-Lippe (OWL) Seminar Lemgo, Germany (Remote) November 4, 2020.
2. "Simulating the Mechanics of Origami to Enable Shape Morphing Structures at Multiple Scales" University of Minnesota Geomechanics Seminar, (Remote) October 30, 2020.
3. "Simulating Elasticity and Contact in Origami-inspired Structures," Packaging School Seminar, Michigan State University, East Lansing MI, February 4, 2020.
4. "Simulating Elasticity and Contact in Origami-inspired Structures," TAM/SPREE Invited Seminar at Northwestern University, Evanston IL, October 31, 2019.
5. "Simulating Contact in Deformable Origami Structures," Keynote Lecture at Society of Engineering Science 2019 Technical Meeting, Washington University in St. Louis, St. Louis, MO, October 15.
6. "Simulating Elasticity and Contact in Origami-inspired Structures," Applied & Interdisciplinary Mathematics Seminar at the University of Michigan, Ann Arbor, MI, September 13, 2019.
7. "Using Origami to Make Deployable and Adaptable Structures at Multiple Scales," Naval Surface Warfare Center, Carderock Division, Informational Seminar, Bethesda, MD, August 21, 2019.
8. "Using Origami to Make Deployable and Adaptable Structures at Multiple Scales," Architectural Engineering Seminar University of Waterloo, Waterloo, ON, July 9, 2019.
9. "Mechanics and Dynamics of Reconfigurable Curved Creased Origami Arrays," Acoustical Society of America Annual Meeting, Louisville, KY, May 13, 2019.
10. "Tailoring the Mechanics of Origami for Deployable and Adaptable Structures," Ohio State University Mechanical and Aerospace Engineering Seminar Series, Columbus, OH, April 5, 2019.

11. "Tailoring the Mechanics of Origami to Make Deployable and Adaptable Structures," Schoolcraft College, Livonia, MI, February 4, 2019.
12. "Tailoring the Mechanics of Origami to Make Deployable and Adaptable Structures." American Society of Civil and Environmental Engineering, University of Michigan Student Chapter, Ann Arbor, MI, January 18, 2019.
13. "Tailoring the Mechanics of Origami to Enable Large-scale Deployable and Adaptable Infrastructure," National Academies of Science, Engineering and Medicine, Arab-American Frontiers Meeting, Kuwait City, Kuwait, November 4, 2018.
14. "Active Infrastructure: A Vision Inspired from Folding Origami Structures," FHWA and NSF Workshop on Active Infrastructure at the Smart and Connected Communities Meeting, Kansas City, MO, March 26, 2018.
15. "Deployable Origami Structures with High Out-of-Plane Stiffness," Department of Civil & Environmental Engineering, University of Illinois at Urbana-Champaign, February 23, 2018.
16. "Analysis of Origami Structures and Metamaterials," Department of Civil & Environmental Engineering & Earth Sciences Structures Seminar Series, University of Notre Dame, September 28, 2017.
17. "Structural Analysis of Tubular Origami Systems," Workshop on Origami Design for Integration of Self-Assembling Systems for Engineering Innovation (ODISSEI), Florida International University, April 27, 2017.
18. "Using Origami for Deployable Structures and Adaptable Metamaterials," Structural Engineering and Geomechanics Graduate Student Seminar, Stanford University, November 18, 2016.
19. "Tailoring the Stiffness of Deployable Origami Structures," Structural Engineering Seminar, Department of Civil and Environmental Engineering, University of Michigan, November 15, 2016.
20. "Reconfigurable Origami Tubes with Tunable Stiffness," National Center for Supercomputing Applications (NCSA) Materials and Manufacturing Seminar Series, UIUC, November 12, 2015.
21. "Origami Tube Structures with Reconfigurable Geometry and Tunable Stiffness," School of Civil and Environmental Engineering, Georgia Institute of Technology, Atlanta, GA, August 27, 2015.
22. "Eigenfrequency Band-gaps in Topology Optimization and Origami," Department of Civil Engineering and Architecture, Hiroshima University, Hiroshima, Japan, April 14, 2014.
23. "Topology Optimization for Structural Dynamics Using Multiresolution Polygons," Materials Group Seminar, Civil and Environmental Engineering at UIUC, February 5, 2014.
24. "Multiresolution Polygonal Elements for Topology Optimization in Structural Dynamics," NSF Graduate Research Fellows Lightning Talks, UIUC, February 28, 2013.
25. "Ground Strain Fragility Relations for Segmented Buried Pipelines," Kandilli Observatory and Earthquake Research Institute, Boğaziçi University, Istanbul, Turkey, July 27, 2011.
26. "Seismic Behavior of Quasi-Isolated Bridge Systems and Components," Kandilli Observatory and Earthquake Research Institute, Boğaziçi University, Istanbul, Turkey, July 14, 2011.
27. "Damage to Large Segmented Buried Pipe due to PGD from the 1999 Izmit, Turkey Earthquake," Indo-US Research Academy, Pune, India, October 9, 2008.

Poster Presentations

1. “A Bar and Hinge Model for Scalable Structural Analysis of Origami”, *Society of Engineering Sciences 2015 Technical Meeting*, College Station, TX, October 26-28, 2015.
2. “Tailoring Structural Dynamic Behavior through Topology Optimization with Multiresolution Polygons”, *Computational Science and Engineering Annual Meeting*, UIUC, April 24-25, 2013.
3. “Seismic Behavior of Quasi-Isolated Bridge Systems and Components & Topology Optimization Design of High-rise Buildings Subjected to Dynamic Loading”, *DCAMM advanced course on Topology Optimization*, Lyngby, Denmark, June 29-July 5, 2011.
4. “Seismic Behavior of Quasi-Isolated Bridge Systems and Components,” *NEES & MCEER Annual Meeting - Quake Summit 2011*, Buffalo, NY, June 9-11, 2011.
5. “Damage to Segmented Buried Pipe during the 1999 Izmit Earthquake,” *Undergraduate Research Forum and Awards*, RPI, March 28, 2008.

TEACHING EXPERIENCE

Deployable and Reconfigurable Structures (CEE 501) – University of Michigan Winter 2020

Course Topics: Theory, analysis, and design of deployable and reconfigurable structures. Review of existing and emerging structural systems such as bar linkages, pantographs (scissor mechanisms), origami structures, bi/multi-stable units, and others Conceptual topics include deployment kinematics, stability, geometric constraints, mechanical behaviors, energy formulations, and matrix analysis of the systems. Practical areas discussed in the course include structural design, material systems, actuation technologies, and fabrication methods.

Structural Dynamics (CEE 511) – University of Michigan Winter 2017; Fall 2017,18,19,20

Course Topics: Dynamic equilibrium of structures. Response of a single degree of freedom system to dynamic excitation: free vibration, harmonic loads, pulses and earthquakes. Response spectra. Response of multi-degree of freedom systems. Seismic behavior of buildings and the basis of seismic building codes.

Solid and Structural Mechanics (CEE 212) – University of Michigan Winter 2019, 21

Course Topics: Fundamental principles of solid and structural mechanics and their application in engineering disciplines. Concepts of stress and strain, stress and strain transformations, axial, torsion, bending and combined loading and elastic deformations.

Structural Engineering (CEE 360) – University of Illinois Fall 2013

Course Topics: Analysis, behavior, and design of trusses and framed structures under static loads; member forces in trusses, shear and moment diagrams, deflections, simple applications of the force method and slope-deflection; computer applications.

Finite Element Methods (CEE 570) – as TA at University of Illinois Jan. – May 2012

Course Topics: Theory and application of the finite element method; stiffness matrices for triangular, quadrilateral, and isoparametric elements; two- and three-dimensional elements; algorithms necessary for the assembly and solution; direct stress and plate bending problems for static, nonlinear buckling and dynamic load conditions; displacement, hybrid, and mixed models together with their origin in variational methods.

Design of Structural Systems (CEE 465) - as TA at University of Illinois Aug. – Dec. 2010

Course Topics: Examination of the whole structural design process including definition of functional requirements, selection of structural scheme, formulation of design criteria, preliminary and computer-aided proportioning, and analysis of response, cost, and value.

PROFESSIONAL EXPERIENCE

Wiss, Janney, Elstner Associates, New Haven, CT - Structural Engr. Intern 2008 & 2009

- Performed destructive and nondestructive testing, field investigations and condition surveys on steel, concrete, masonry, and wood structural systems.
- Analyzed and designed structural & architectural components, and worked with clients, architects and contractors to develop plans and specifications for reconstruction projects.

CG Power Solutions, Albany, NY - Structural Engr. Intern
2007-2008 (Formerly MSE Power Systems, Inc.)

- Drafted and designed structures that carry electrical equipment in mid-sized substations.

SERVICE ACTIVITIES

External

1. **Committee Chair:** Elasticity Committee, ASCE Engineering Mechanics Institute (EMI). 2020 – present.
2. **Committee Vice-Chair:** Elasticity Committee, ASCE EMI. 2018 – 2020.
3. **Mini-Symposium organizer:**
 - “Origami and Kirigami: From Self-Assembly to Architected Materials” at the Society of Engineering Science (SES) 2020 Virtual Conference, September 29, 2020.
 - “Origami/Kirigami Inspired Structures and Metamaterials” at the ASCE Engineering Mechanics Institute (EMI) 2019 Conference, Pasadena, CA, June 18-21, 2019.
 - “Origami/Kirigami Based Systems and Adaptive Structures” at the ASCE Engineering Mechanics Institute (EMI) 2018 Conference, Boston, MA, June 4-7, 2018.
 - “Thin Shelled and Adaptive Structures” at the ASCE 3rd Engineering Mechanics Institute (EMI) International Conference, Rio de Janeiro, Brazil, March 19-22, 2017.
4. **Journal Reviewer:** • *Physical Review Letters*; • *Soft Matter*; • *Proceedings of the Royal Society A*; • *J. Royal Society Interface*; • *Physical Review Materials*; • *Int. J. Numerical Methods in Engineering*; • *Extreme Mechanics Letters*; • *Int. J. Solids and Structures*; • *SIGGRAPH - ACM Transactions on Graphics*; • *ASME J. Applied Mechanics*; • *ASCE J. Structural Engineering*; • *ASME J. Mechanical Design*; • *J. Structural and Multidisciplinary Optimization*; • *Automation in Construction*; • *Mechanics Research Communications*; • *J. Constructional Steel Research*; • *Structure and Infrastructure Engineering*; • *Computational and Applied Mathematics*; • *Int. J. Spatial Structures*.
5. **Committee Member:** • Elasticity Committee ASCE Engineering Mechanics Institute. 2017 – Present. • Computational Mechanics Committee ASCE Engineering Mechanics Institute. 2017 – Present.

6. **Committee Chair:** Earthquake Engineering Research Institute (EERI) National Student Leadership Council – Transition Working Group on Membership, Participation, and Long-term Goals 2012-2013.
7. **Library Outreach Activities:** Organized public workshop on origami for adults and children with presentation about the potential applications of origami in engineering, and hands-on activity for making origami models and structures. • Ann Arbor District Library – December 2, 2017; • Champaign Public Library June 11, 2016.

Internal at University of Michigan

1. Faculty Advisor of Chi Epsilon Honor Society 2019-Present
2. Faculty Advisor of the Theme Park Engineering Group (TPEG) 2018-Present
3. CEE Graduate Committee 2017W, 2019-Present
4. CEE Undergraduate Recruitment Committee 2017-Present
5. CEE Master's Committee 2017-2019

PROFESSIONAL MEMBERSHIPS

American Physical Society (APS)
American Society of Civil Engineers (ASCE)
American Society of Mechanical Engineering (ASME)
Chi Epsilon – National Civil Engineering Honor Society
Engineering Mechanics Institute (EMI) of ASCE
Society of Engineering Sciences (SES)
Tau Beta Pi – National Engineering Honor Society
U.S. Association for Computational Mechanics (USACM)

(Last Updated - March 25, 2021)