Ali Beheshti, Ph.D.

Assistant Professor, Department of Mechanical Engineering, George Mason University, Fairfax, VA

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Academic Appointments:

01/2018-present **Assistant Professor**
Multiscale Tribology and Contact Mechanics Laboratory (μTCM)
Mechanical Engineering Department, George Mason University, Fairfax, VA, USA

08/2015-12/2017 **Assistant Professor**
Multiscale Tribology and Contact Mechanics Laboratory (μTCM)
Mechanical Engineering Department, Lamar University, Beaumont, TX, USA

08/2015-08/2017 **Adjunct Professor**
Mechanical Engineering Department, Texas A&M University, College Station, TX, USA

08/2014-08/2015 **Visiting Assistant Professor and Research Associate**
Mechanical Engineering Department, Texas A&M University, USA (Mentor: *Prof. Andreas A. Polycarpou)*

01/2014-08/2014 **Research Associate and Teaching Fellow**
Mechanical Engineering Department, Louisiana State University, USA

2008-2013 **Research Assistant**
Center for Rotating Machinery (CeRoM), Mechanical Engineering Department, Louisiana State University, USA

2004-2007 **Research Assistant and Consultant**
Center for Computational Mechanics, Mechanical Engineering Department, Isfahan University of Technology.

Education:

(Post-doc) **Tribology/Thin Films**
(2014-2015) Mechanical Engineering Department, Texas A&M University, USA (Mentor: *Prof. Andreas A. Polycarpou)*

Ph.D. **Mechanical Engineering/Tribology and Contact Mechanics**
(2013) **Minor in Civil and Environmental Engineering/Structural Systems**
Louisiana State University, Baton Rouge, LA, USA
Supervisors: *Prof. Michael M. Khonsari and Prof. George Z. Voyiadjis*

M.Sc./ B.Sc. **Mechanical Engineering/Mechanical Design and Applied Mechanics**
(2007)/(2004) Isfahan University of Technology, Esfahan, Iran

Research Proposals (Funded/Pending):

- High temperature tribological performance of Ni alloys under helium environment for very high temperature gas cooled reactors (VHTRs), DOE-NEUP, Role: George Mason/Lamar University PI, Total award: $773,000-funded, PI share: $168,000 (October 2016-September 2019).
- MRI: Acquisition of an Advanced Nano-indenter for Multiscale Mechanical Characterization of Materials at Lamar University, Role: PI, *NSF-CMMI-MRI*, August 2017-

September 2018, Total award: $395,800-funded-Upon termination with Lamar University PI Changed, effective January 2018**.**

- Engineering of the Surface Topography for Marine Antifouling Applications, *Center for Advances in Port Management (CAPM)*, Role: Co-PI Total amount $35,000-funded, (February 2017-September 2017).
- Collaborative Research: Nano-textured transparent self-cleaning coating with superior anti-wear/impact characteristics for PV solar panels, Role: George Mason University PI, *NSF-CBET-Energy for Sustainability*, October 2017, Total award: $423,000-pending.
- Collaborative Research: Tribotropy Approach: A unified Irreversible thermodynamics framework for tribological degradations, Role: George Mason University PI, *NSF-CMMI-MEP*, January 2018, Total award: $461,700-pending.

Undergraduate Funded Research Proposals (as a mentor):

- URSP at George Mason University
  - ✓ John Recktenwald- Energy Absorption Analysis of Additively-Manufactured Lattice Metamaterials, $5000 (Summer 2018).
- NASA Texas Space Grant STEM Columbia Crew Memorial scholarship program (Lamar University):
  - ✓ Chris Rhode $1500 (2017).
  - ✓ Andre Trottire, $1500 (2016).
- OUR program for undergraduate research at Lamar University:
  - ✓ Kevin Peterson-Friction and Durability Analysis of 3D-Printed Surfaces, $1000 (2017).
  - ✓ Andrew Hunt-Combined effects of texturing and nano-lubrication on friction coefficient in internal combustion engines, $1000 (2016).
  - ✓ John Gust- Tribological Behavior of Vertical Graphene nano-layers, $1000 (2016). Best Research Award 2016.

Research Interests:

- Multiscale Contact and Interfacial Mechanics, Surface Texturing
- High Temperature Tribology
- Surface Reliability of Additively Manufactured Components
- Thin Films, Nano-indentation/Scratch
- Mechanical Metamaterials
- Renewable Energy (Solar Panels and Wind Turbine Failure Analysis and Prevention)
- Biotribology (Hip and Knee Joints Contact and Damage Analysis)
- Fatigue, Fracture and Damage Mechanics, Thermodynamics of Degradation
- Reliability Analysis and Sustainable Design

Teaching Experience:

Instructor:

2018-present

- ***George Mason University (Dept. Avg: 4.1/5)***

Spring 2018-Statics ME 221, Enrollment: 17, Student evaluation: **4.78**

2015-2017

- ***Lamar University (Dept. Avg: 4.0/5)***

Fall 2017-Statics MEEN2301, Enrollment: 42, Student evaluation: **4.65**
Spring 2017-Dynamics MEEN2302, Enrollment: 50, Student evaluation: **4.8**
Spring 2017-Statics MEEN2301, Enrollment: 41, Student evaluation: **4.75**
Fall 2016-Intro. to Tribology MEEN4334, Enrollment: 20, Student evaluation:**4.9/5**

Summer 2016-Tribology MEEN5301, Enrollment: 11, Student evaluation: **4.78/5**
Spring 2016- Dynamics MEEN2302, Enrollment: 46, Student evaluation: **4.74/5**
Spring 2016-Tribology MEEN5301, Enrollment: 55, Student evaluation: **4.7/5**
Fall 2015- Tribology MEEN5301 (Newly developed course-Graduate level), Enrollment: 50, Student evaluation: **4.6/5**
Fall 2015- Intro. to Tribology ENGR4301 (Newly developed course-Undergraduate level)
Enrollment: 21, Student evaluation: **4.86/5**

- ***Texas A&M University (Dept. 5-year Avg: 3.9/5)***

2014-2015

Spring 2015- Statics and Particle Dynamics MEEN 221, enrollment: 85- student evaluation. **4.7/5**
Fall 2014- Statics and Particle Dynamics MEEN 221, enrollment: 100- student evaluation. **4.5/5** (Dept. 5-year Avg: 3.9)

- ***Louisiana State University (Dept. 5-year Avg: 3.9/5)***

2014

Dynamics ME 3133- Spring 2014-enrollment: 185 and Summer 2014-enrollment: 70-student evaluation. **4.4/5**

2015-Present

Advisor/Co-Advisor/Mentoring

- George Mason University, Tribology and Surface Mechanics (TSM) Lab (Director: *Ali Beheshti*)
  - ✓ Sepehr Salari, Multiscale wear and frictional behavior of nickel alloys for very high temperature applications.
  - ✓ Manisha Tripathy**:** Adhesion in micro-rough curved surfaces.
- Lamar University, Multiscale Tribology and Contact Mechanics Lab (Director: *Ali Beheshti*)

Doctorate student:

- ✓ Sepehr Salari, Multiscale wear and frictional behavior of nickel alloys for very high temperature applications
- ✓ Mehrdad Moeinzadeh: Design and manufacturing of polymeric metamaterials

Master students:

- ✓ Manisha Tripathy**:** Adhesion in micro-rough curved surfaces (Graduated, Fall 2017).
- ✓ Parthkumar Patel: Contact angle estimation of hydrophobic surfaces with semi-Hertzian approach (Graduated, Fall 2017).
- ✓ Akshay Patel: Tribological behavior of electrospun nano-fiber ATSP coatings (Graduated, Fall 2017).

2014-2015

- ✓ Amartya Rupak: Yield maps for soft functionally graded material coatings.
- ✓ Amr Anwar Soliman: Contact mechanics of micro-impact with layered surfaces (Graduated, Fall 2016).
- ✓ MdSaifur Rahman: Yield maps for functionally graded material coatings (Graduated, Fall 2016).
- Texas A&M University, Micro-tribology Dynamics Lab (Director: *Andreas A. Polycarpou*)
  - ✓ Co-advising a Ph.D. student on contact mechanics and wear analysis of a new protective self-cleaning coating used for Photovoltaic Panels

2004-2008

Instructor:

- Isfahan University of Technology, Esfahan, Iran (2006-2008)
  Mechanics of Materials I,II, Machine Design I,II-Statics, Vibration
- Borhan Danesh Institute, Esfahan, Iran (2005-2007)
  Dynamics, Statics

Other Major Research Proposals Experience (not funded):

- SusChEM: Collaborative Research: Innovative Residual Management: Transformative Approach to Reduce Poultry House Wastes, Role: Lamar University PI, NSF-CBET October 2015, Total award: $308,000.
- Cost-Effective Hybrid Self-Cleaning Coating for Photovoltaic Panels, Role: Co-PI Texas A&M University; PI: ATSP Innovations, submitted to DOE-ARPA-E February 2015, Total award: $2,000,000.
- Novel Nanotextured Protective Coatings with Efficiency Gains for Solar Panel Installations in Qatar, Role: Co-PI; Lead PI: Andreas Polycarpou (Texas A&M University), Qatar National Research Foundation, December 2014, Total award: $892,000.
- Introducing New Waste Materials as a Sustainable Rejuvenator Agent for Asphalt Binder, Role: PI, Lead PI: Somayeh Asadi (Pennsylvania State University), Qatar National Research Foundation, December 2014, Total award: $897,000.
- Unification of surface degradation processes via entropy concept, National Science Foundation (NSF), Role: Senior Personnel, PI: Michael Khonsari, October 2013, Total award: $343,000.

Publications:

Journal Papers

1. Ben-Romdhane, M., El-Borgi, S., **Beheshti, A.**, and Usman, S. "Hertzian Sliding Contact of a Graded Orthotropic Coating with an Embedded Crack: Dynamic Mixed Mode Stress Intensity Factors", *Acta Mechanica*, under review, January 2019.
2. **Beheshti, A.**, Alinia, Y., Guler, M. A., El-Borgi, S., Andreas A. Polycarpou, A. A., "Yielding Maps for Functionally Graded Coating/Substrate System under Scratch", *Wear*, under review, January 2019.
3. Munther, M., Palma, T., Angeron, I., Salari, S., Ghassemi, H., Vasefi, M., **Beheshti, A.*** and Davami, K., 2018, "Microfabricated Biomimetic Placoid Scale-Inspired Surfaces for Antifouling Applications" *Applied Surface Science*, Vol. 453, 166-172 (2018).
4. Rahman, M., Ding, J., **Beheshti, A.**, Xinghang Zhang, X., Polycarpou, A. A., "Elevated Temperature Tribology of Ni Alloys under Helium Environment for Nuclear Reactor Applications", *Tribology International*, Vol. 123, 2018.
5. Michael Munther, M., Palma, T., **Beheshti, A.** and Keivan Davami "Substrate-Regulated Nanoscale Friction of Graphene", *Materials Letters*, Vol. 221, Pages 54-56, 2018.
6. Mohsenizadeh, M., Gasbarri, F., Munther, M., **Beheshti, A.*** and Davami, K., "Additively-Manufactured Lightweight Metamaterials for Energy Absorption", *Materials & Design,* 139, pp.521-530, 2018.
7. Lee, J., **Beheshti, A.** and Polycarpou, A. A., "Rough Surface Normal Nanocontact Stiffness: Experimental Measurements and Rough Surface Contact Model Predictions", *Journal of Applied Mechanics-ASME*, Vol. 84, Issue 3, Page: 031006, 2017.
8. Humood, M., **Beheshti, A.**, and Polycarpou, A. A., "Surface Reliability of Annealed and Tempered Solar Protective Glasses: Indentation and Scratch Behavior", *Solar Energy,* Vol. 142, Page: 13-25, 2017.
9. Humood, M., **Beheshti, A.**, and Polycarpou, A. A., "Normal impact of sand particles with solar panel glass surfaces", *Tribology International*, Vol. 102, Page: 237-248, 2016.

10. Alinia, Y., **Beheshti, A.**, Guler, M. A., El-Borgi, S., Polycarpou, A. A., "Sliding Contact Analysis of Functionally Graded Coating/Substrate System", *Mechanics of Materials*, 94, 142-155, 2016.
11. Chatterjje, A., **Beheshti, A.**, Polycarpou, A. A. and Bellon P., "Yield Maps for Single and Bilayer Thin Films under Scratch", *Journal of Tribology-ASME*, Vol. 138, Issue 3, Page: 031402, 2016.
12. Asadi, S., Hassan, M., **Beheshti, A.**, Berryman, C., "Quantification of Residential Energy Consumption Reduction Using Glass-Modified Asphalt Shingle", *Journal of Architectural Engineering*, B4015003, 2015.
13. **Beheshti, A.**, Khonsari, M. M., "On the Contact of Curved Rough Surfaces: Contact Behavior and Predictive Formulas", *Journal of Applied Mechanics-ASME*, Vol. 81, Issue 11, Page: 111004, November 2014.
14. Aghdam, A.B., **Beheshti, A.,** Khonsari, M. M., "Prediction of Crack Nucleation in Rough Line-Contact Fretting via Continuum Damage Mechanics Approach", *Tribology letters*, Vol. 53, Issue 3, Page: 631-643, March 2014.
15. **Beheshti, A.,** Khonsari, M. M., "An Engineering Approach for the Prediction of Wear in Mixed Lubricated Contacts", *Wear,* Vol. 308, Page: 121-131, 2013.
16. **Beheshti, A.,** Aghdam, A.B., Khonsari, M. M., "Deterministic Surface Tractions in Rough Contact under Stick-Slip Condition: Application to Fretting Fatigue Crack Initiation", *International Journal of Fatigue,* Vol. 56, Pages: 75-85, 2013.
17. **Beheshti, A.**, Khonsari, M. M., "Micro Asperity Contact Models as Applied to the Deformation of Rough Line Contact", *Tribology International,* Vol. 52, Pages: 61-74, 2012.
18. Aghdam, A.B., **Beheshti, A.**, Khonsari, M. M., "On the Fretting Crack Nucleation with Provision for Size Effect", *Tribology International*, Vol. 47, Pages: 32-43, 2012.
19. **Beheshti, A.**, Khonsari, M. M., "On the Prediction of Fatigue Crack Initiation in Rolling/Sliding Contacts with Provision for Loading Sequence Effect", *Tribology International*, Vol. 44, Pages: 1620-1628, 2011.
20. **Beheshti, A.**, Khonsari, M. M., "A Thermodynamic Approach for Prediction of Wear Coefficient Under Unlubricated Sliding Condition", *Tribology Letters*, Vol. 38, No. 3, Pages: 347-354, 2010.
21. Asadi, S., Hassan, M. and **Beheshti, A. "**Performance Analysis of an Attic Radiant Barrier System Using Three Dimensional Transient Finite Element Method", *Journal of Building Physics,* Vol. 36, Pages: 247-264, 2013
22. Asadi, S., Hassan, M. and **Beheshti, A**. "Development and Validation of a Simple Estimating Tool to Predict Heating and Cooling Energy Demand for Attics of Residential Buildings", *Building and Energy*, Vol. 54, Pages: 12-21, 2012.
23. Mahmoud Salimi, Mostafa Jamshidian, **Ali Beheshti**, A. R. Sadeghi, "Bending-Unbending Analysis of Anisotropic Sheet Under Plane Strain Condition", *Journal of Computational Methods in Engineering* (*Esteghlal)*, Vol. 26, No.2, Pages: 77-86, March 2007 (in Persian, abstract is available in English).

In preparation:

1. **Beheshti, A.**, Masjedi M. "On the Effect of Surface Roughness in mixed-EHL Contact of Artificial Hip Joints", *in preparation*, August 2017.
2. **Beheshti, A.**, Khonsari, M. M., "Mixed-lubrication of Curved Rough Surfaces-An Engineering Approach", *in preparation*, August 2017.

3. Rahman, M. S., and **Beheshti, A.**, "Yielding Behavior of Single/Multilayer and Functionally Graded Layer Coatings under Scratch", *in preparation*, August 2017.

Selected Conference Papers and Presentations

1. Munther, M., Gasbarri, F., Salari, S., **Beheshti, A.** and Davami, K., "Additively-Manufactured Lightweight Metamaterials for Energy Absorption", ASME conference, Tampa, 2017.
2. Salari, S., and **Beheshti, A.**, "Extraction of Mechanical Characteristics of Metallic alloys under very high temperature", ASME conference, Tampa, 2017.
3. Salari, S., and **Beheshti, A.**, "Hot Nano-indentation of Metallic Alloys: Experiments and Simulations", STLE conference, Atlanta 2017.
4. Rahman, M. S., and **Beheshti, A.**, "Yielding Behavior of Single/Multilayer and Functionally Graded Layer Coatings under Scratch", STLE Tribology Frontiers, November 2016, Chicago, USA.
5. Hummod, M., **Beheshti, A.**, and Polycarpou, Andreas A., "Wear Resistance Analysis of Protective Coating for Solar Panel Application", *STLE 70th Annual Meeting & Exhibition*, Dallas, Texas 2015.
6. **Beheshti, A.**, Khonsari, M. M., Analysis of Contact in Smooth and Rough Surfaces: Contact Characteristics and Tribo-Damage, *12th Annual Mechanical Engineering Conference*, 27 April 2013, Mechanical Engineering Department, Louisiana State University, LA, USA (First rank presentation)
7. **Beheshti, A.**, Khonsari, M. M., "Prediction of Wear in Lubricated Contacts" ASME/STLE Tribology Joint Conference (IJTC), 8-10 October, 2012, Denver, CO, USA
8. Asadi, S., Hassan, M., and **Beheshti, A.**, "Residential Attic with Radiant Barrier System: Finite Element Simulation and Parametric Study", *ASC 48th Annual International Conference,* 11-14 April, 2012*,* Birmingham City University, England
9. Asadi, S., Hassan, M., and **Beheshti, A. "**On the Performance Analysis of Attic Radiant Barrier Using Transient Finite Element Model", *Industrial Engineering Research Conference (IERC), Construction Track*, 21-25 May 2011, RENO, NV, USA
10. Asadi, S., Hassan, M., and **Beheshti, A**. "Finite Element Analysis of Attic Radiant Barrier Insulation system performance in Residential Buildings", *Engineering Sustainability 2011: Innovation and the Triple Bottom Line Conference*, 10-12 April 2011, Pittsburgh, PA, USA.
11. Mostafa Jamshidian, **Ali Beheshti**, A.R. Sadeghi, Mahmoud Salimi, "Analysis of Strip Residual Curvatures in Anti-cross bow Cassette in Tension leveling Process", *Proceedings of the 12th International Conference on Metal Forming, Metal Forming 2008*, Pages: 513-20, Verlag Stahleisen, Kraków, Poland.
12. M. Salimi, M. Jamshidian, **A. Beheshti**, M. Silani, "Bending-Unbending Analysis of Anisotropic Sheet under Plane Strain Condition", 14th Annual (International) Mechanical Engineering Conference (ISME), Isfahan, Iran, May 2006.
13. M. Silani, **A. Beheshti**, M.R. Forouzan, "Effect of Patch Connection Methods on Fracture Resistance of Cracked Sheets", 14th Annual (International) Mechanical Engineering Conference (ISME), Isfahan, Iran May 2006.

Presentations:

- Presentation of a seminar on "Multiscale Analysis of Contact in Smooth and Rough Surfaces: Contact Characteristics and Tribo-Damage", Mechanical Engineering Department, Prairie View A&M University, June 2014, Prairie View, Texas.
- Presentation of a seminar on "Contact in Smooth and Rough Surfaces: Contact Characteristics and Tribo-Damage", Mechanical Engineering Department, University of Akron, May 2013, Akron, Ohio.
- Presentation of a poster on "Fast Prediction of Wear in Lubricated Contacts", ASME/STLE Tribology Joint Conference (IJTC), 8-10 October, 2012, Denver, Colorado.
- Presentation of a seminar on "Bending-Unbending Analysis of Anisotropic Sheet Under Plane Strain Condition" 14th Annual International Mechanical Engineering Conference, May 2006, Esfahan, Iran.
- Presentation of a seminar on "Effect of Patch Connection Methods on Fracture Resistance of Cracked Sheets" 14th Annual International Mechanical Engineering Conference, May 2006, Esfahan, Iran.

Workshops:

- Writing/Designing Winning NSF Proposals Workshop, Houston, TX, January 2016.
- Fundamentals of Entrepreneurship, College of Business boot camp, Lamar University, September 2016.
- 8th Annual Faculty Development Workshop, 21-23 May 2014, College of Engineering, Louisiana State University.
- Science: Becoming the Messenger, National Science Foundation, 17 November 2011, Baton Rouge, Louisiana.

Professional Activities

Proposals Reviewing Experience:

Proposal reviewing panel:

- NSF-CMMI/MEP
- NSF-CMMI/MRI
- FONDECYT Program, National Commission for Scientific and Technological Research (CONICYT), Chile

Journal and Conference Editorial and Reviewing Services:

Member of editorial board:

- Advances in Mechanical Engineering, Sage (Guest editor: Special issue on "The Application of Nanotechnology in Mechanical Engineering")

Assistant to the editor (2014):

- Journal of Tribology, Transaction of ASME

Frequent reviewer for:

- Journal of Tribology, Transaction of ASME (+30)
- Tribology International, Elsevier (+50)
- Applied Thermal Engineering, Elsevier (+30)
- Wear, Elsevier (+15)

Also reviewer for:

- IMechE, Part B: Journal of Engineering Manufacture, Sage

- IMechE, Part C: Journal of Mechanical Engineering Science, Sage
- IMechE, Part E: Journal of Process Mechanical Engineering, Sage
- IMechE, Part J: Engineering Tribology, Sage
- Applied Mathematical Modeling (APM), Elsevier

Outreach and Academic Attendances:

- Co-Chair, Materials Tribology Session, STLE Conference, May 2018, Minneapolis, Minnesota, USA.
- Tribology Experiments Camp, Organizer for "Friction Stir Welding of Polymeric Additively Manufactured Materials" Booth, 6th annual STLE-STEM Student Camp, May 2018, Minneapolis, Minnesota,, USA.
- Organizer for "NEMS/MEMS pressure Sensor" Booth, Annual High/Middle School Students Engineering Youth Conference, Volgenau School of Engineering, George Mason University, February 2018.
- Co-Chair, Materials Tribology Session, STLE Conference, May 2017, Atlanta, USA.
- Chair, Materials Tribology Session, STLE Tribology Frontiers Conference, November 2016, Chicago, USA.
- Tribology Experiments Camp, Organizer for "Friction Stir Welding of Additively Manufactured Materials" Booth, 3th annual STLE-STEM Student Camp, May 2015, Dallas, Texas, USA.
- Co-Chair and Organization Committee, 11th Annual Mechanical Engineering Conference, 21 April 2012, Louisiana State University, LA, USA.
- Workshops Director, ISME (2006); 14th Annual International Mechanical Engineering Conference, Isfahan, Iran.
- Student Committee, ISME (2005); 13th Annual International Mechanical Engineering Conference, Isfahan, Iran.
- Executive Committee and Interpreter, ACFM (2002); 9th Asian Congress of Fluid Mechanics, Isfahan, Iran.

Experimental Skills/Equipment

Experience working with Tribometer (friction and wear testing), Nanoindenter, Rheometer, SEM, Fretting and Fatigue Tester, Material Characterization Tester (Tensile/Torsion static and fatigue testing), Rolling/Sliding Contact Rig (lubrication, friction, wear and contact fatigue testing).

Honors and Membership:

Member of:

- Golden Key International Honor Society
- American Society of Mechanical Engineering (ASME)
- Society of Tribologist and Lubrication Engineers (STLE)

Awards:

- Texas State University Merit Professor Award March 2017 (best university junior professor in teaching performance and innovation).
- Outstanding Reviewer for Applied Thermal Engineering, Elsevier (2014)

- Best Dissertation Award, College of Engineering, Louisiana State University (2014)
- Best Researcher Award of the Year, Mechanical Engineering Department, Louisiana State University (2013)
- Graduate School Travel Award, Louisiana State University (2012)
- Ranked 1st among 30 graduate students in the PhD qualifying examination at LSU in 2009.
- Graduate School Scholarship for 4 years, Louisiana State University, (2008-2012).
- Graduated with honors, 1st Rank among Mechanical Engineering Department M.Sc. Students, Isfahan University of Technology, (2004-2007).
- Graduated with honors, 2nd Rank among Mechanical Engineering Department B.Sc. Students, Isfahan University of Technology, (2000-2004).
- 4 Academic Awards of Appreciation and Scholarship for 4 years. Isfahan University of Technology, (2002-2006).