

CURRICULUM VITAE

Personal Information

Name: Mohammad Ebrahim Torki

Date of Birth: 08/24/1985

Professional email: mtorki@sc.edu

Gender: Male

Status: USA permanent resident

Personal email (preferred): mtorki85@gmail.com

Education

- **Doctor of philosophy** (2013–2019): *Aerospace Engineering*, Texas A&M University (degree plan GPA: 3.9/4.0)
 - Thesis topic: Ductile Fracture under Combined Tension and Shear: Theory and Applications
 - Advising committee: A. A. Benzerga (chair), J–B. Leblond, A. Needleman, J. N. Reddy, J. R. Walton
- **Master of science** (2009–2011): *Structural Mechanics and Earthquake Engineering*, Sharif University of Technology, Tehran (GPA: 4.0/4.0)
 - Thesis topic: Dynamic Stability of Functionally-Graded Cylindrical Shells under Follower Loads
 - Advising committee: M. T. Kazemi (chair), H. Haddadpour, F. Rahimzadeh
- **Bachelor of science** (2004–2008): *Structural and Earthquake Engineering*, Isfahan University of Technology (GPA: 4.0/4.0)
 - Project topic: Design and Optimization of Fiber-Reinforced Roller-Compacted Concrete Pavements
 - Advisor: M. Madhkhan
- **Preparation college** (2002–2003): *I. M. Baqir* cultural and education foundation, Isfahan (GPA: 4.0/4.0)

Work Experience

1. **Assistant research professor** (2024–present): Department of Mechanical Engineering, University of South Carolina, Columbia, SC. Role: Technical lead of project entitled “Extraction of many material properties from analysis of a few data rich experiments”, funded by the *Defense Advanced Research Projects Agency* (DARPA).
2. **Visiting assistant professor** (2023–2024): College of Engineering, Embry-Riddle Aeronautical University, Daytona Beach, FL. Role: Teaching junior and senior-level courses in *Solid Mechanics* and *Engineering Mechanics*, conducting and directing research in Design and Manufacturing of Polymer-Reinforce Composites; funded by the *Small Business Research Initiative* (SBRI) program.
3. **Senior research scholar** (2021–2023): Laboratory for Research on the Structure of Matter (LRSM), University of Pennsylvania, Philadelphia, PA (*mentors*: Prof’s V. Shenoy, Z. Chen). *Project topic*: (i) Multiscale and Multiphase Modeling of Single and Collective Migration in Fibrous Extracellular Matrices, funded by the *National Science Foundation* (NSF); (ii) Extended Phase-Field Modeling of Inter-Cellular Repulsion in Network Formation of Endothelial Cells; funded by the *National Institute of Health* (NIH).
4. **Postdoctoral research associate** (2019–2021): Department of Engineering, University of Cambridge (*advisor*: Prof. V. Deshpande). *Project topic*: Scalable Growth of Dry and Colloidal Powder-Based Crystals and their Inverse Structures, funded by the *Office of Naval Research* (ONR).
5. **Lecturer** (2018–2019): College of Engineering, Texas A&M University, College Station, TX (*mentor*: Prof. V. Kinra). Role: Teaching advanced graduate-level courses in *Continuum Mechanics* and *Engineering Fracture Mechanics* (as well as an undergraduate equivalent in *Fundamentals of Fracture Mechanics*); funded by the College of Engineering *Graduate Teaching Fellowship* (GTF) program.
6. **Graduate research assistant** (2013–2019): Department of Aerospace Engineering, Texas A&M University (*advisor*: A. Benzerga). *Project topic*: Ductile Fracture under Combined Tension and Shear: Theory and Applications; funded by the *National Science Foundation* (NSF).
7. **Graduate research assistant** (2013): Department of Civil and Environmental Engineering, Texas A&M University (*advisor*: J. N. Reddy). *Project topic*: Stability of Functionally-Graded Beams with Partially Delaminated Piezoelectric Layers.
8. **Lecturer** (2011–2012): Department of Mechanical and Civil Engineering, Islamic Azad University, Isfahan, Iran.
9. **Graduate research assistant** (2009–2011): Department of Civil and Environmental Engineering, Sharif University of Technology (*advisor*: M. T. Kazemi).
10. **R&D consultant** (2008–2009): Faratarh Ariana and Sepahan Beyond–Research Engineering Corporations, Isfahan, Iran.

Awards, Honors and Funding

1. **Graduate teaching fellowship (GTF)** (2018–2019): College of Engineering, Texas A&M University (lecturer for advanced graduate-level courses in *Continuum Mechanics* and *Engineering Fracture Mechanics*)

2. **Honorary reviewer** (2013): “An Introduction to Nonlinear Finite Element Analysis: with applications to heat transfer, fluid mechanics, and solid mechanics,” J. N. Reddy, Oxford University Press, 3rd Ed.
3. **First-place Doctoral Mathematics award** (2015): *12th Annual Pathways Student Research Symposium*, Texas A&M University.
4. **Conference awards** (2015–2017): *Society of Engineering Science (SES)*, Northeastern University, Boston, MA, 2017; *2016 Mach Conference*, April 6-8, Annapolis, MD; *13th U.S. National Congress on Computational Mechanics*, July 27-30, San Diego, CA 2015.
5. **First rank** (2012): National PhD entrance exam (approximate number of candidates: 25000), Iran.
6. **49th rank** (2008): National MS entrance exam (approximate number of candidates: 25000), Iran.

Activities

1. **Program coordination** (2023): Incorporation of Aerospace and Aviation Engineering in Civil and Environmental Engineering (newly designed program entitled *Aerospace Infrastructure*), Embry-Riddle Aeronautical University.
2. **Membership** (2020–present): *American Society of Mechanical Engineers (ASME)*, *American Institute of Aeronautics and Astronautics (AIAA)*.
3. **Membership** (2016–present): *Iran's National Elites Foundation (INEF)*.
4. **Journal reviewer** (2015–present): *Journal of the Mechanics and Physics of Solids (JMPS)*; *Journal of Applied Mechanics (ASME)*; *International Journal of Solids and Structures (IJSS)*; *International Journal of Fracture (IJF)*; *Journal of Engineering Mechanics (ASCE journal)*; *Mechanics of Materials*; *Smart Structures and Systems, An International Journal (Technopress)*; *International Journal of Structural Stability and Dynamics (IJSSD)*.
5. **Judge and session chair** (2014–2019): *Student Research Week*, Texas A&M University.
6. **Session chair** (2015): ASME 2015 *International Mechanical Engineering Congress & Expo (IMECE 2015)*, session chair for the *Mechanics of Deformation and Failure of Energy Materials* symposium.
7. **Honorary reviewer** (2013): “An Introduction to Nonlinear Finite Element Analysis: with applications to heat transfer, fluid mechanics, and solid mechanics,” J. N. Reddy, Oxford University Press, 3rd Ed., USA, 2014, ISBN 978-0199641758.
8. **School Certificate** (2014): *IIMEC School on Computational Materials Science across Scales*, Texas A&M University.
9. **Teaching Preparation Course** (2013): College of Engineering, Texas A&M University.
10. **Welding Inspection and Testing Certificate** (2006): *Iranian Society for Nondestructive Testing*.

Teaching

1. **Engineering Mechanics and Solid Mechanics** (2023): College of Engineering, Embry-Riddle Aeronautical University.
2. **Continuum Mechanics** (2018): Department of Aerospace Engineering, Texas A&M University.
3. **Engineering Fracture Mechanics** (2018): Department of Aerospace Engineering, Texas A&M University.
4. **Fundamentals of Material Science and Engineering** (2017): Department of Aerospace Engineering, Texas A&M University.
5. **Numerical Methods in Engineering** (2014): Department of Aerospace Engineering, Texas A&M University.
6. **Aerospace Structural Analysis** (2013–2014): Department of Aerospace Engineering, Texas A&M University.
7. **Structural Dynamics and Earthquake Engineering** (2008–2012): Department of Mechanical and Civil Engineering, Islamic Azad University; Departments of Civil and Environmental Engineering, Sharif and Isfahan Universities of Technology.
8. **Theory of Structures (elementary and advanced)** (2011–2012): Department of Mechanical and Civil Engineering, Islamic Azad University.

Research Interests and Background

1. **Multi-scale fracture** and material failure.
2. **Microstructural effects** in material failure.
3. **Scalable material manufacturing**.
4. **Soft materials**: Colloidal crystals, Cells and Soft tissues.
5. **Multi-phase materials**: Homogenization, Phase-Field modeling, Discrete-Element modeling.
6. **Multifunctional and composite materials**: Particle-based materials, Functionally-graded materials (FGM's), Fiber-reinforced concrete, High-entropy alloys (HEA's).
7. **Structural mechanics**: Failure-based design, Vibration, Static and Dynamic Instability.

Publications

Google Scholar: h-index 11, i10-index 12 ([link](#))

ORCID Profile: [link](#)

- **Peer-Review Journal Articles**

1. M. E. Torki, Z. Gong and Z. Chen (2024), "A Unified Phase-Field Model for Single and Collective Cell Migration", *Bulletin of the American Physical Society* (in preparation).
2. M. E. Torki, F. Liu, R. Xu, Y. Chen, J. Fredberg, Z. Chen (2024), "Bridging the Gap in Cancer Cell Behavior Against Matrix Stiffening: Insights from a Trizonal Model", *eLife* (under review).
3. M. E. Torki and A. A. Benzerga, "A Mechanism-Based Constitutive Model of Failure under Combined Tension and Shear", *Journal of the Mechanics and Physics of Solids* (in preparation).
4. M. E. Torki (2024), "A Rigorous Upper-Bound Criterion for Coalescence of Three-Dimensional Voids", *Journal of Applied Mechanics* (in preparation).
5. M. E. Torki, F. A. Medrano, J-B. Leblond, A. A. Benzerga (2024), "A Criterion for Coalescence of Three-Dimensional Voids", *Mechanics of Materials* 196: 105077.
6. M. E. Torki, Z. Chen, F. Liu (2023), "Phenotype Heterogeneity Warrants Trizonal Feedback between Intracellular Contractility and Extracellular Stiffening", *bioRxiv* (in preprint).
7. M. E. Torki and V. S. Deshpande (2023), "A Buoyancy-Assisted Mechanism of Scalable Colloidal Crystallization", *Advanced Powder Technology* 34(8): 104099.
8. M. E. Torki, A. A. Benzerga and J-B. Leblond (2023), "Approximate Analysis of Void Coalescence in Columns", *Mechanics of Materials* 179: 104603.
9. M. E. Torki, F. Medrano, A. A. Benzerga and J-B. Leblond (2023), "A Model of Void Coalescence in Columns", *Journal of the Mechanics and Physics of Solids* 171: 105134.
10. M. E. Torki (2022), "Scalable Processing of Granular Crystals by High-Frequency Oscillation", *Powder Technology* 395: 822-837.
11. M. E. Torki and A. A. Benzerga (2022), "Ductile Fracture in Plane Stress", ASME. *Journal of Applied Mechanics*. 89(1): 011001. <https://doi.org/10.1115/1.4052106>.
12. S.B. Talaeitaba, F. Khamesh and M. E. Torki (2020), "Stiffened Trapezoidally-Corrugated Plates in Open-Section Shear Walls", *International Journal of Steel Structures* (2021). <https://doi.org/10.1007/s13296-021-00527-5>.
13. M. E. Torki, S. M. Keralavarma, and A. A. Benzerga (2021), "An Analysis of Lode Effects in Porous Material Plasticity", *Journal of the Mechanics and Physics of Solids* 153: 104468.
14. M. E. Torki (2019), "A Unified Criterion for Void Growth and Coalescence under Combined Tension and Shear", *International Journal of Plasticity* 119: 57-84.
15. M. E. Torki and A. A. Benzerga (2018), "A Mechanism of Failure in Shear Bands", *Extreme Mechanics Letters* 23:67-71.
16. M. E. Torki and A. A. Benzerga (2018), "Micromechanics-based Constitutive Relations for Post-Localization Analysis", *MethodsX* 5, 1431-1439.
17. S. B. Talaeitaba, H. Esmaili, and M. E. Torki (2017), "On the Effect of Reduced Boundary Elements in Steel Shear Walls", *International Journal of Structural Integrity* 8(1): 1-24, DOI 10.1108/IJSI-10-2015-0045.
18. M. E. Torki, C. Tekoğlu, J.-B. Leblond, and A. A. Benzerga (2016), "Theoretical and Numerical Analysis of Void Coalescence in Porous Ductile Solids under Arbitrary Loadings" *International Journal of Plasticity* 91: 160-181.
19. M. E. Torki and J. N. Reddy (2016), "Buckling of Functionally-Graded Beams with Partially Delaminated Piezoelectric Layers," *International Journal of Structural Stability and Dynamics* 16(1), 1450104 (25 p).
20. M. E. Torki, A. A. Benzerga, and J.-B. Leblond (2015), "On Void Coalescence under Combined Tension and Shear," *Journal of Applied Mechanics*, Vol. 82(7), Article No. 071005. DOI 10.1115/1.4030326.
21. S. B. Talaeitaba, M. Halabian, and M. E. Torki (2015), "Nonlinear Behavior of FRP-Reinforced Concrete-Filled Double-Skin Tubular Columns using Finite Element Analysis", *Thin-Walled Structures* (95): 389-407.
22. M. Madhkhan, S. Nowroozi, and M. E. Torki (2015), "Flexural Strength of Roller Compacted Concrete Pavements Reinforced with Glass Roved Textiles," *Structural Engineering and Mechanics* 55(1), DOI 10.12989/sem.2015.55.1.000.
23. M. E. Torki, M. T. Kazemi, and S. B. Talaeitaba (2015), "Effect of Axial Deformation on Flutter of Cantilevered FGM Cylindrical Shells under Axial Follower Forces," *International Journal of Civil Engineering (IJCE)* 13(2): 160-170.
24. S. B. Talaeitaba, and M. E. Torki (2015), "Nonlinear Finite Element Analysis to Extract Linear and Curvilinear Ranges of Torsion-Shear Interaction Curves for Reinforced Concrete Beams," *Journal of Scientia Iranica*.
25. M. E. Torki, M. T. Kazemi, H. Haddadpour, and S. Mahmoudkhani (2014), "Dynamic Stability of Functionally Graded Cylindrical Shells under Axial Follower Forces," *Thin-Walled Structures* 79: 138-146.
26. M. E. Torki, M. T. Kazemi, J. N. Reddy, H. Haddadpour, and S. Mahmoudkhani (2014), "Dynamic Stability of Functionally Graded Cylindrical Shells under Distributed Axial Follower Forces," *Journal of Sound and Vibration* 333(3): 801-817.
27. M. Madhkhan, A. Kianpour, and M. E. Torki (2013), "Life-Cycle Cost Optimization of Prestressed Simple-span Concrete Bridges with Simple and Spliced Girders," *Iranian Journal of Science and Technology (IJST)*, 37(C1): 53-66.
28. M. Madhkhan, M. Entezam, and M. E. Torki (2013), "Mechanical Properties of Steel Fiber-Reinforced Concrete Slab Tracks on Non-Ballasted Foundations," *Scientia Iranica. Transaction A, Civil Engineering* 20(6): 16-26.
29. M. Madhkhan, R. Azizkhani, and M. E. Torki (2012), "Effects of Pozzolans together with Steel and Polypropylene Fibers on Mechanical Properties of RCC Pavements," *Journal of Construction and Building Materials* 26: 102-112.

30. M. E. Torki, M. T. Kazemi, and S. Mahmoudkhani (2012), "Diversity between Shell-like and Beam-like Regions for a Cantilever Cylindrical Shell under Follower Forces," *International Journal of Advanced Structural Engineering*, 4(9): 1-13.
31. M. E. Torki and M. T. Kazemi (2012), "Effect of Axial Vibration on Flutter of Cantilevered Cylindrical Shells under Follower Forces," *Journal of Computational and Applied Research in Mechanical Engineering*, 2(1): 15-24.
32. M. Madhkhan, M. Entezam, and M. E. Torki (2012), "Mechanical Properties of Precast Reinforced Concrete Slab Tracks on Non-Ballasted Foundations," *Journal of Scientia Iranica A*, 19(1): 20-26.
33. M. Madhkhan, R. Azizkhani, and M. E. Torki (2011), "Roller Compacted Concrete Pavements Reinforced with Steel and PP Fibers," *Journal of Structural Engineering and Mechanics*, 40(2): 149-165.
34. M. E. Torki, B. Talaeitaba, and F. Farahbod (2011), "Effect of Opening Dimensions on the Relative Flexural Operation of Coupled Shear Walls," *Asian Journal of Civil Engineering*, 13(3): 417-427.
- **Conference Proceedings**
35. A. Hosseini Kordkheili, H. Moshrefzadeh, and M. E. Torki (2011), "Mechanical Properties of Double-Layered Graphene Sheets Using Nonlinear Finite Element," In: *19th Annual Conference on Mechanical Engineering (ISME)*, May 2011, Faculty of Engineering, The University of Birjand, Islamic Republic of Iran, No. 2303.
36. M. Madhkhan, M. E. Torki, and M. Bagheri (2009), "Properties of Light-weight Structural Leca Concrete in Precast Concrete Segments," In: *First National Conference on Engineering and Management of Infrastructures*, Faculty of Engineering, Tehran University, Islamic Republic of Iran, No. 10363.
- **Book Chapters**
37. Chapter: Design of Staircase Systems (2010), "Complete Guide to Code-Based Design of Reinforced Concrete Structures," by B. Talaeitaba and A. Arshian, Abed publications, Tehran, Iran, 1st Ed, ISBN 9643648596.

Featured Skills

1. **Programming:** FORTRAN, MATLAB, MAPLE, MATHEMATICA, Python, C and C++.
2. **Multiphysics analysis and design:** COMSOL, ABAQUS, ANSYS, LS-DYNA.
3. **Molecular and particle dynamics:** LAMMPS, ABAQUS Explicit, OVITO, CrystalMaker.
4. **CALPHAD (Calculation of Phase Diagrams):** LAMMPS.
5. **Visualization:** ParaView, VESTA.
6. **Statistics and Machine learning:** Python, R Studio.
7. **Structural analysis and design:** SAP, ETABS, SAFE, ABAQUS CAE.
8. **Experimental mechanics:** Digital Image and Volume Correlation (DIC, DVC), X-ray tomography, Welding inspection and nondestructive testing (WPS, PQR, NDT).
9. **Detailing:** AutoCAD, Revit (Structure, Architecture), Adobe (Photoshop, Aminate, Illustrator), Grasshopper.

Scientific Presentations

1. **Missouri University of Science and Technology:** Invited seminar (How to Teach Mechanics), Department of Mechanical Engineering (2024).
2. **University of Michigan, Ann Arbor:** Invited seminar, Department of Naval Architecture and Marine Engineering (2024).
3. **Texas A&M University:** Invited seminar, Department of Aerospace Engineering (2023).
4. **Michigan Technological University (MTU):** Invited seminar, Department of Mechanical Engineering (2023).
5. **Cornell High Energy Synchrotron Source (CHESS):** Cornell University (2021).
6. **International Conference on Plasticity, Damage, and Fracture:** Puerto Vallarta, Mexico (2018).
7. **Society of Engineering Science (SES):** Northeastern University (2017), Texas A&M University (2015).
8. **Mach Conference:** Annapolis, MD (2016).
9. **International Mechanical Engineering Congress & Expo (IMECE):** Houston, TX (2016).
10. **Annual Pathways Student Research Symposium:** Texas A&M University, Corpus Christi (2015).