Hossein Sharifi

Contact Information

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Links : Personal Website, Google Scholar,
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Education

University of Kentucky, Lexington, KY, USA
Ph.D., Mechanical Engineering May 2023
Thesis Topic: *Multiscale Modeling of Cardiac Growth and Baroreflex Control*
Advisor: Jonathan F. Wenk, Ph.D
GPA: 3.94/4.0

University of Kentucky, Lexington, KY, USA
M.S., Civil Engineering May 2018
Thesis Topic: *Finite Element Evaluation of 2-Cell RC Box Culverts*
Advisor: Issam E. Harik, Ph.D
GPA: 4.0/4.0

Shiraz University Shiraz, Iran
B.S., Civil and Environmental Engineering, December 2014

Industry Experience

Genetesis, Mason, OH, USA Aug 2023 - present
Computational Scientist

Dassault Systèmes, Providence, RI, USA May 2022 - July 2023
Industry Solution Technical (Cardiovascular Biomechanics Engineering) - Intern

- Developed a hemodynamic reflex loop (barorreflex) in a lumped-parameter model of circulation of the heart.
- Executed hundreds of FEM simulations of mitral valves (Explicit FEM).
- Performed sensitivity analyses.
- Created a surrogate model of the mitral valve using machine learning techniques to estimate the clinical characteristics of virtual patients trained by physics-based FE models.
- Executed FE modeling of the insertion of the edge-to-edge MitraClip medical device.

Kentucky Transportation Center (KTC), Lexington, KY, USA Summer 2019
Structural Engineer (Graduate Student Assistant)

- Simulated FE load rating of bridge size reinforced concrete culverts.

Pey-Azad Co., Shiraz, Iran 2015 - 2016
Structural Engineer

Tak-Khiz Fars Co., Shiraz, Iran 2014 - 2015
Construction Project Engineer

Computer Skills

- Engineering software: Abaqus, LS-DYNA, ANSYS, FEniCS Project, ParaView, CANDE, STAAD Pro, SAP 2000, ETABS, SAFE, CSI Bridge, BRASS-CULVERT, Solidworks, Autodesk
- Programming languages: Python, JavaScript, HTML, MATLAB
- Python packages: NumPy, pandas, SciPy, scikit-learn, Keras, TensorFlow, MPI4PY, Matplotlib

Research Experience

University of Kentucky, Lexington, KY, USA — August 2018 - present
Research Assistant - Dept. of Mechanical and Aerospace Engineering

- Developed a multiscale FE model of left ventricular mechanics using FEniCS solver. (MyoFE project).
  - Multiscale modeling of left ventricular growth
  - Multiscale modeling of acute myocardial infarction
  - Multiscale modeling of baroreflex control of arterial pressure
- Developed PyCMLuti Python package for generating scientific plots.
- Contributed to the development of a single hemispherical model of left ventricular function (PyMyoVent project).
- Acquired cardiac magnetic resonance imaging (DENSE, dark and bright blood) of mice using 7T Bruker MR scanner.
  - Performed strain analysis of mice heart using cardiac magnetic resonance feature tracking.

University of Kentucky, Lexington, KY, USA — Jan 2017 - May 2018
Research Assistant - Dept. of Civil Engineering

- FE-based load rating of bridge size reinforced concrete box culverts.

Shiraz University, Shiraz, Iran — May 2015 - March 2016
Department of Civil and Environmental Engineering

- Investigated seismic behavior of retrofitted reinforced concrete beam-column joints by FRP sheets

Research Interests

Computational Mechanics, Finite Element Analysis, Cardiac Biomechanics, Multiscale Modeling, Machine Learning, Data-Driven Modeling

Publications

- **Published**
  1. **Sharifi H.**, Mann, C.K., Wenk J. F., Campbell K. S. *A multiscale model of the cardiovascular system that regulates arterial pressure via closed loop baroreflex control of chronotropism, cell-level contractility, and vascular tone*, Biomech Model Mechanobiol, (2022). https://doi.org/10.1007/s10237-022-01628-8
  2. **Sharifi, H.**, Mann, C.K., Rockward, A.L. et al. *Multiscale simulations of left ventricular growth and remodeling*, Biophys Rev 13, 729–746 (2021). https://doi.org/10.1007/s12551-021-00826-5
  3. **Sharifi H**., Mann, C.K., Noor, A.Z., et al. *Reproducibility of systolic strain in mice using cardiac magnetic resonance feature tracking*, Cardiovasc Eng Tech, (2022). https://doi.org/10.1007/s13239-022-00621-7
  4. **Sharifi H**., Peiris A., Harik I. E., *Triage Method for Load Rating Bridge Size Two-Cell Reinforced Concrete Box Culverts for the AASHTO LRFD Design Load*, Structure and Infrastructure Engineering (2021). https://doi.org/10.1080/15732479.2021.2015793
- **In Progress**
  1. **Sharifi H.**, Lee L., Campbell K. S., Wenk J. F. *A multiscale finite element model of left ventricular mechanics incorporating baroreflex regulation* (2023)
  2. **Sharifi H.**, Mann C. K., Mehri M., Campbell K. S.,Lee L., Wenk J. F. *Multiscale finite element modeling of left ventricular growth in simulations of valve disease* (2023)

Awards

1. Awarded travel funding for attending to **Cardiac Physiome Workshop**
   Source of funding: National Science Foundation (NSF)
   Amount: $ 800 April 2023
2. Awarded travel funding for attending to **Cardiac Physiome Workshop**
   Source of funding: Dept. of Mechanical and Aerospace Engineering, University of Kentucky
   Amount: $ 900 April 2023
3. Awarded travel funding for attending to **Summer Biomechanics, Bioengineering, and Biotransport Conference (SB3C)**
   Source of funding: Dept. of Mechanical and Aerospace Engineering, University of Kentucky
   Amount: $ 900 June 2022

Presentations

- **Podium presentations**
  1. Title: Multiscale Modeling of Baroreflex Feedback Loop in Response to Acute Myocardial Infarction June 2023
     Conference: **Summer Biomechanics, Bioengineering, and Biotransport Conference (SB3C)**, United States, Vail, CO
  2. Title: Multiscale Modeling of Baroreflex Feedback Loop in Response to Acute Myocardial Infarction April 2023
     Conference: **Cardiac Physiome Workshop**, United States, Irvine, CA
  3. Title: Multiscale modeling of cardiac growth in simulations of valvular disease-PhD project February 2023
     Conference: **The Living Heart Project webinar**, United States, (Virtual)
  4. Title: 2022 Living Heart Technology Update December 2022
     Conference: **8th International Symposium on The Living Heart And Virtual Twin For Humans**, United States, Brooklyn, NY (Virtual)
  5. Title: Multiscale modeling of cardiac valve disease using cell-level signals to drive myocardial growth June 2022
     Conference: **Summer Biomechanics, Bioengineering, and Biotransport Conference (SB3C)**, United States, Cambridge, MD
  6. Title: Multiscale modeling of LV growth under autonomic regulation of baroreflex feedback loop July 2021
     Conference: **Modeling the Cardiac Function: Theory, Numerical Methods, Clinical Applications**, Italy (Virtual)
  7. Title: Multiscale modeling of LV growth under autonomic regulation of baroreflex feedback loop June 2021
     Conference: **Summer Biomechanics, Bioengineering, and Biotransport Conference (SB3C)**, United States (Virtual)
- **Poster presentations**
  1. Title: Multiscale modeling of cardiac valve disease using cell-level signals to regulate concentric and eccentric myocardial growth July 2022
     Conference: 9th World Congress of Biomechanics (WCB), Taiwan (Virtual)
  2. Title: Multiscale modeling of cardiac valve disease using cell-level signals to regulate concentric and eccentric myocardial growth April 2022
     Conference: University of Kentucky Center for Clinical and Translational Science (CCTS)

3. Title: Quantifying the Effects of Hypertrophic Cardiomyopathy (HCM) using MRI — July 2019
   Conference: University of Kentucky Gill Heart & Vascular Institute, Cardiovascular Research Day

Teaching Experience

Teaching Assistant

- ME 501 - Mechanical Design with Finite Element Methods — Fall 2019
  Department of Mechanical and Aerospace Engineering, University of Kentucky
- CE 584 - Design of Timber and Masonary Structures — Fall 2017
  Department of Civil Engineering, University of Kentucky

Relevant Courses

- Mechanics of Plastic Solids I - ME 603 — Spring 2019
- Matrix Theory & Numeric Linear Algebra I - MA 522 — Fall 2018
- Mechanics of Composite Materials - ME 506 — Fall 2017
- Foundation of Solid Mechanics - ME 641 — Fall 2017
- Introduction to Finite Element Analysis - CE 621 — Spring 2017
- Advanced Structural Analysis - CE 682 — Fall 2016
- Biostatistics - CPH 580 — Fall 2018

Certificates

- **Introduction to Computer Vision and Image Processing** — March 2022
- **Introduction to Deep Learning & Neural Networks with Keras** — Feb 2022
- **Machine Learning with Python** — Feb 2022
- **Applied Plotting, Charting & Data Representation** — July 2020
- **Introduction to Data Science in Python** — June 2020
- **Introduction to programming with MATLAB** — Sept 2015
- HSE Management System training course by TUV Rheinland — May 2014

Volunteer Activities

- Participating in large vaccination of the University of Kentucky's employees and students against delta variant of COVID-19. — September 2021