

Amin Ajdari

360 Huntington Ave, 334SN, Boston, MA 02115 • 617-785 5375 • amin.ajdari@gmail.com

Education

Northeastern University, Boston, MA

PhD in Mechanical Engineering
(Advisor: Prof. Ashkan Vaziri) Dec 2011

Northeastern University, Boston, MA

Master of Science in Mechanical Engineering
(Advisor: Prof. Hamid Nayeb-Hashemi) Apr 2008

University of Tehran, Tehran, Iran

Bachelor of Science in Mechanical engineering Aug 2004

Positions and Employment

Sep 2011-Dec 2011 *Instructor* - Engineering Mechanics: Statics and Dynamics
Department of Mechanical and Industrial Engineering, Northeastern University

Sep 2008-present *Research Assistant*
Department of Mechanical and Industrial Engineering, Northeastern University

May 2008-Sep 2008 *Research Engineer Intern*
Abiomed Inc, Danvers, MA

Jan 2006-May 2008 *Research Assistant/Teaching Assistant/Lab Instructor*
Department of Mechanical and Industrial Engineering, Northeastern University

Aug 2003-Aug 2004 *Lab Instructor* - Mechatronics Laboratory
Department of Mechanical Engineering, University of Tehran, Tehran, Iran

Nov 2003-Jan 2006 *Service Engineer*
SUNVA Company, Tehran, Iran

Sep 2002-Mar 2003 *R&D Engineer*
SAPCO Company, Tehran, Iran

Jun 2002-Sep 2002 *Engineering Intern*
IKCO, Tehran, Iran

Sep 2001-Sep 2003 *Lab Instructor* - Dynamics and Vibrations, Mechanics of Materials
Department of Mechanical Engineering, University of Tehran, Tehran, Iran

Honors and Awards

July 2009 USNCCM Travel Award
10th U.S. National Congress on Computational Mechanics, Columbus, OH

May 2010 Joseph Ferretti Academic Excellence Fellowship
Department of Mechanical and Industrial Engineering, Northeastern University

Jan 2011 NSF Student Participation grant
NSF CMMI Research and Innovation Conference, Atlanta, GA

July 2011 USNCCM Travel Award
11th U.S. National Congress on Computational Mechanics, Minneapolis, MN

Journal Publications

published/in press:

1. **A. Ajdari**, H. Nayeb-Hashemi, P.K. Canavan, G. Warner "Effect of defect on elastic-plastic behavior of cellular materials", *J of Mat. Sci. and Eng.*, A 487 (2008) 558-567.
2. **A. Ajdari**, P.K. Canavan, H. Nayeb-Hashemi, G. Warner, "Mechanical properties of functionally graded 2-d cellular structures: A finite element study", *J of Mat. Sci. and Eng.*, A 499 (2009) 434-439.
3. S.C. Corbett, **A. Ajdari**, A.U. Coskun, H. Nayeb-Hashemi, "In vitro and computational thrombosis on artificial surfaces with shear stress", *Artificial Organs*, 34 (2010) 561-569.
4. B.H. Jahromi, **A. Ajdari**, H. Nayeb-Hashemi, A. Vaziri, "Autofretage of layered and functionally graded metal-ceramic composite vessels", *Composite Structures*, 92 (2010) 1813-1822.

5. S.C. Corbett, **A. Ajdari**, A.U. Coskun, H. Nayeb-Hashemi, "Effect of pulsatile blood flow on thrombosis potential with a step wall transition", *ASAIO*, 56 (2010) 290-295.
6. **A. Ajdari**, H. Nayeb-Hashemi, A. Vaziri, "Dynamic crushing and energy absorption of regular, irregular and functionally graded cellular structures", *Int. J. Solids Struct.*, 48 (2011) 506-516.
7. A. Vaziri, **A. Ajdari**, A. A. Twohig, H. Ali, "Structural reliability of reinforced concrete chimneys subjected to uncontrolled fire", *Eng. Struct.*, 33 (2011) 2888-2889.
8. D. Vella, **A. Ajdari**, A. Vaziri, A. Boudaoud, "Wrinkling of pressurized elastic shells", *Physical Rev Lett.*, 107 (2011) 174301.
9. M. Ashrafi, **A. Ajdari**, N. Rahbar, J. Papadopoulos, H. Nayeb-Hashemi, A. Vaziri, "Single lap adhesively bonded joints with non-flat interfaces", *Int. J. Adhesion & Adhesives*, 32 (2012) 46-52..
10. D. Vella, **A. Ajdari**, A. Vaziri, A. Boudaoud, "The indentation of pressurized elastic shells: From polymeric capsules to yeast cells", *J Royal Society Interface*, in press.
11. S. Babaei, B.H. Jahromi, **A. Ajdari**, H. Nayeb-Hashemi, A. Vaziri, "Mechanical properties of open-cell rhombic dodecahedron cellular structures", *J of Mat. Sci. and Eng.*, in press.
12. **A. Ajdari**, B. H. Jahromi, J. Papadopoulos, H. Nayeb-Hashemi, A. Vaziri, "Hierarchical honeycombs with tailorable properties", *Int. J. Solids Struct.*, in press.

submitted:

13. A. A. Twohig, F. Tamanini, H. Ali, **A. Ajdari**, A. Vaziri, "Thermal analysis of reinforced concrete chimneys with fiberglass plastic liners during uncontrolled fires", *Eng. Struct.*, submitted.

Conference Proceedings/Abstract

1. A. Marzban, **A. Ajdari**, G.M. Warner, P.K. Canavan, H. Nayeb-Hashemi, "The influence of muscle loadings on the density distribution of the proximal femur", *Proc. ASME IMECE2006-14996*, Chicago, IL, 2006.
2. **A. Ajdari**, H. Nayeb-Hashemi, P.K. Canavan, "Effect of defect on elastic-plastic and creep behavior of cellular materials", *Proc. ASME IMECE2007-42056*, Seattle, WA 2007.
3. **A. Ajdari**, P.K. Canavan, H. Nayeb-Hashemi, G. Warner, "Effect of defect on elastic/plastic and creep behavior of bone: a finite element study", *Proc. ASME SBC2007-175843*, Keystone, CO, 2007.
4. **A. Ajdari**, H. Nayeb-Hashemi, P.K. Canavan, "Mechanical behavior of functionally graded 2-d cellular structures: A finite element study", *Proc. ASME IMECE2008-66206*, Boston, MA 2008.
5. S.C. Corbett, **A. Ajdari**, A.U. Coskun, H. Nayeb-Hashemi, "Effect of blood viscosity on thrombosis potential near a step wall transition", *Proc. ASME SBC2009-205647*, Lake Tahoe, CA, 2009.
6. **A. Ajdari**, B.H. Jahromi, H. Nayeb-Hashemi, A. Vaziri, "Dynamic crushing of regular and functionally graded cellular materials", *USNCCM X*, Columbus, OH 2009.
7. B.H. Jahromi, G. H. Farrahi, **A. Ajdari**, H. Nayeb-Hashemi, A. Vaziri, "Variable materials property method for functionally graded materials", *USNCCM X*, Columbus, OH 2009.
8. B.H. Jahromi, **A. Ajdari**, A. Vaziri, "A numerical method for predicting elasto-plastic response of functionally graded materials", *COMPLAS X (Int. Conf. Computational Plasticity)*, Barcelona, Spain, 2009.
9. **A. Ajdari**, B.H. Jahromi, H. Nayeb-Hashemi, A. Vaziri, "Dynamic crushing of regular and functionally graded cellular structures", *RICC 2009*, Northeastern University, Boston, MA 2009.
10. A. Vaziri, **A. Ajdari**, "Mechanics and dynamics of instability and deformation localization in elastic shells", *Proc. ASME IMECE2009-11716*, Lake Buena Vista, FL, 2009.
11. **A. Ajdari**, B. H. Jahromi, H. Nayeb-Hashemi, A. Vaziri, "Energy absorbance and dynamic strength of regular, irregular and functionally graded cellular structures", *Proc. ASME IMECE2009-10539*, Lake Buena Vista, FL, 2009.
12. M.-W. Moon, **A. Ajdari**, A. Vaziri, "Sculpting on polymers with ion beam/plasma treatment: mechanics and mechanisms", *Proc. ASME IMECE2009-10539*, Lake Buena Vista, FL, 2009.
13. **A. Ajdari**, B. H. Jahromi, A. Vaziri, "Heterogeneous cellular structures for energy absorption and impact applications", *Int. Symp. Plasticity*, St. Thomas, Virgin Islands, 2010.

14. A. Vaziri, **A. Ajdari**, "Homogenization and failure of metal sandwich panels subjected to air shocks", *IMPLAST 2010*, Providence, RI.
15. **A. Ajdari**, S. Babaei, A. Vaziri, "Dynamic crushing and energy absorption of cellular structures", *IMPLAST 2010*, Providence, RI.
16. A. Vaziri, B. Haghpanah Jahromi, **A. Ajdari**, "Failure and fracture of shock-loaded metal sandwich panels", *Proc. ASME IMECE2010-39923*, Vancouver, BC, 2010.
17. S. Babaei, B.H. Jahromi, **A. Ajdari**, H. Nayeb-Hashemi, A. Vaziri, "Mechanical properties of open-cell cellular structures with rhombic dodecahedron cells", *Proc. ASME IMECE2010-39924*, Vancouver, BC, 2010.
18. B.H. Jahromi, **A. Ajdari**, H. Nayeb-Hashemi, A. Vaziri, "Linear buckling analysis of cracked cylindrical shell under axial compression", *Proc. ASME IMECE2010-39794*, Vancouver, BC, 2010.
19. **A. Ajdari**, L. Mahadevan, A. Vaziri, "Localization and curvature-driven wrinkling in elastic shells", *New England Workshop on the Mechanics of Materials and Structures*, 2010.
20. **A. Ajdari**, S. Babaei, A. Vaziri, "Heterogeneous and functionally graded cellular structures", *New England Workshop on the Mechanics of Materials and Structures*, 2010.
21. **A. Ajdari**, A. Vaziri, "Curvature-driven instability and wrinkling in elastic shells", *MRS Fall Meeting*, 2010.
22. A. Vaziri, S. Babaei, B.H. Jahromi, **A. Ajdari**, H. Nayeb-Hashemi, "Elasto-plasto properties and energy absorption of 3D tessellated cellular structures", *Plasticity*, 2011.
23. A. Vaziri, B.H. Jahromi, **A. Ajdari**, H. Nayeb-Hashemi, "Extended Variable Materials Property (X-VMP) method for elasto-plasto analysis", *Plasticity*, 2011.
24. **A. Ajdari**, A. Vaziri, "Multi-scale and cross disciplinary aspects of thin elastic shells", *NSF CMI Research and Innovation Conference*, Atlanta, GA, 2011.
25. B.H. Jahromi, **A. Ajdari**, H. Nayeb-Hashemi, A. Vaziri, "Extended Variable Materials Property (X-VMP) method for elasto-plasto analysis of functionally graded materials and structures", *NSF CMI Research and Innovation Conference*, Atlanta, GA, 2011.
26. **A. Ajdari**, S. Babaei, H. Nayeb-Hashemi, A. Vaziri, "Cellular Structures with Irregular Structural Organization", *Engineering Mechanics Institute (EMI2011) Conference*, Boston, MA, 2011.
27. S. Babaei, **A. Ajdari**, A. Vaziri, "Heterogeneous and functionally graded three-dimensional cellular materials", *SEM Ann. Conf. on Exp. Appl. Mech.*, Uncasville, CT, 2011,
28. S. Babaei, B.H. Jahromi, **A. Ajdari**, H. Nayeb-Hashemi, A. Vaziri, " Energy absorption of heterogeneous and functionally graded cellular structures ", *Sixth MIT Conference on Computational Fluid and Solid Mechanics*, Cambridge, MA 2011.
29. **A. Ajdari**, A. Vaziri, "Mechanical properties and energy absorption of heterogeneous and functionally graded cellular structures", *International Conference on the Mechanical Behavior of Materials (ICM11)*, Como Lake, Italy, 2011.
30. **A. Ajdari**, A. Vaziri, "Mechanics of thin elastic shells upon point indentation", *USNCCM 11*, Minneapolis, MN 2011.
31. **A. Ajdari**, B. H. Jahromi, A. Vaziri, "Structural hierarchy in 2D honeycombs", *USNCCM 11*, Minneapolis, MN 2011.
32. **A. Ajdari**, B. H. Jahromi, A. Vaziri, "Fractal and hierarchical honeycombs", *48th Annual Technical Meeting of the Society of Engineering Science (SES2011)*, Evanston, IL 2011.
33. A. Vaziri, **A. Ajdari**, "Localized features and patterns of strongly-deformed elastic shells", *48th Annual Technical Meeting of the Society of Engineering Science (SES2011)*, Evanston, IL 2011.
34. **A. Ajdari**, B. H. Jahromi, A. M. Hamouda, A. Vaziri, "Hierarchical cellular structures with tailorable properties", *Qatar Foundation Annual Research Forum*, Doha, Qatar, 2011.
35. **A. Ajdari**, B. H. Jahromi, A. Vaziri, "Mechanics of hierarchical honeycombs", *Plasticity*, 2012.
36. A. Nasto, **A. Ajdari**, A. Lazarus, A. Vaziri, P.M. Reis "S-cones in thin shells under indentation", *APS March Meeting*, Boston, MA 2012.

37. **A. Ajdari**, B. H. Jahromi, J. Papadopoulos, A. Vaziri, "Honeycombs with hierarchical organization", *APS March Meeting*, Boston, MA 2012.
38. **A. Ajdari**, B. H. Jahromi, A. Vaziri, "Stiff honeycombs with structural hierarchy", *European Congress on Computational Methods in Applied Sciences and Engineering*, Vienna, Austria, 2012.
39. **A. Ajdari**, B. H. Jahromi, H. Nayeb-Hashemi, A. Vaziri, "Hierarchical honeycombs with enhanced mechanical properties", *XXIII International Congress of Theoretical and Applied Mechanics (ICTAM2012)*, Beijing, China 2012.

Selected Projects

- Honeycombs with tailorable properties Nov 10 - Present
- Introduce a new class of honeycombs with superior mechanical properties
 - Investigate the mechanical behavior of the proposed model using analytical, experimental and numerical methods
 - Enhance the energy absorption of honeycomb structures by introducing hierarchical organization
 - Proposed structure has negative Poisson's ratio and shows multi-stage crushing behavior (enable us to regulate the energy absorption) at large deformation
- Dynamic Behavior of Cellular Solids Sep 08 - Present
- Investigate the dynamic crushing and impact resistance of cellular structures using finite element method (ABAQUS)
 - Both regular hexagonal and non-periodic Voronoi structures are considered
 - Study the effect of different defects on mechanical behavior of structures
 - Investigate the Ballistic impact of 2D regular honeycomb structure
 - Mechanical properties of 3D rhombic dodecahedron cellular structure (both open and close cell)
- Mechanics and Dynamics of Elastic Thin Shells Sep 08 - Present
- Investigate the mechanics and dynamics of instability and deformation localization in elastic thin shells using finite element method (ABAQUS)
 - Carry out a comprehensive investigation of the indentation of spherical pressurized shells, combining a theoretical analysis of the equations of shells, finite element simulations, and macroscopic experiments.
- Structural Reliability of Reinforced Concrete Chimneys Sep 08–Dec 08
- Develop a protocol for studying the behavior and residual structural capacity of reinforced concrete chimneys subject to an uncontrolled fire.
 - Estimate the reduction in the vertical (axial) strength and moment strength of the chimney during fire and post fire
- Fluid Shear Distribution on Artificial Blood Contacting Surfaces May 08–Sep 08
- Understand the fundamental effects of blood flow pulsatility and wall elasticity on thrombosis and cell damage
 - Characterizing the stagnation flow experiment using CFD
 - Simulating both steady flow and pulsating flow (for variety of mean velocity, step transition height and pulsatility index)
 - Performing in vitro blood loop studies to verify the relationships established in the computational model
 - In vitro and computational thrombosis models for artificial blood contacting surfaces
 - Study the effect of blood viscosity on thrombosis potential near a step wall transition
- Mechanical Behavior of Cellular Solids Jan 06-Apr 08
- Investigate the elastic and plastic behavior of regular hexagonal honeycombs and 2D Voronoi structures using finite element method (ABAQUS)
 - Study the effect of different defects on mechanical behavior of structures
 - Simulate both uniaxial and biaxial behavior
 - Study behavior of functionally graded cellular structures
 - Investigate the creep respond for structures with and without defects
 - Participate and present the project progress in weekly group meeting
- Biomechanics of Bone (Microscale) Jan 06-Apr 08

- Develop two dimensional models of trabecular bone in Abaqus
- Study the mechanical behavior of bone which has relevance for several biomedical applications
- Model the effect of local bone resorption due to osteoporosis

Construction and Control of a rotary Inverted Pendulum

Aug 03-Aug 04

- Built rotary inverted pendulum
- Designed Proportional-Integral-Derivative (PID) feedback control
- Evaluated the system for different control methods

Other Activities

Professional Societies

2006-present American Society of Mechanical Engineering (ASME)

2008-present The Honor Society of Phi Kappa Phi

2010-present Society of Experimental Mechanics (SEM)

Editorial Activities

2010-present Reviewer

Int J. Solids Structures, J. Diabetes Science Technology, J. Experimental Mechanics, Int J. Mechanical Sciences

Administrative Responsibilities

2010 Organizer Assistant

The New England Workshop on the Mechanics of Materials and Structures (NEW.MECH 2010)

2011 Organizer Assistant

The New England Workshop on the Mechanics of Materials and Structures (NEW.MECH 2011)

References

will be provided upon request.