

Cornell University*Mechanics of Playground Swinging*

May 2000 - August 2001

- *Advisor:* Prof. A. Ruina
- *Funding:* NSF Research Experience for Undergraduates (REU)
- Investigation of biomechanical principles governing coordination during swinging
- Dynamical analysis comparing optimal strategies for various performance criteria

Journal Publications

- (14) Spontaneous Bending of Piezoelectric Nanoribbons: Mechanics, Polarization, and Space Charge Coupling
C. Majidi, Z. Chen, D. J. Srolovitz, M. Haataja
Journal of the Mechanics and Physics of Solids under minor revision (2009).
- (13) Adhesion between Thin Cylindrical Shells with Parallel Axes
C. Majidi, K. T. Wan
Journal of Applied Mechanics in press (2009).
- (12) A Simplified Formulation of Adhesion Problems with Elastic Plates
C. Majidi, G. G. Adams
Proceedings of the Royal Society A **465** 2217-2230 (2009).
- (11) Shear Adhesion between an Elastica and a Rigid Flat Surface
C. Majidi
Mechanics Research Communications **36** 369-372 (2009).
- (10) Adhesion of an elastic plate to a sphere
C. Majidi, R. S. Fearing
Proceedings of the Royal Society A **464** 1309-1317 (2008).
- (9) Sliding-induced adhesion of stiff polymer microfiber arrays. I. Macroscale behavior
J. Lee, C. Majidi, B. Schubert, R. S. Fearing
Journal of the Royal Society Interface **5** 835-844 (2008).
- (8) Sliding-induced adhesion of stiff polymer microfiber arrays. II. Microscale behavior
B. Schubert, J. Lee, C. Majidi, R. S. Fearing
Journal of the Royal Society Interface **5** 845-853 (2008).
- (7) Analysis of Shaft-Loaded Membrane Delamination Using Stationary Principles
C. Majidi, R. E. Groff, R. S. Fearing
Mathematics & Mechanics of Solids **13** 3-22 (2008).
- (6) Ancestrally high elastic modulus of gecko setal beta-keratin
A. M. Peattie, C. Majidi, A. Corder, R. J. Full
J. Royal Society Interface **4** 1071-1076 (2007).
- (5) Remarks on formulating an adhesion problem using Euler's elastica
C. Majidi
Mechanics Research Communications **34** 85-90 (2007).
- (4) Towards Friction and Adhesion from High Modulus Microfiber Arrays
B. Schubert, C. Majidi, R. E. Groff, S. Baek, B. Bush, R. Maboudian, R. S. Fearing
Journal of Adhesion Science & Technology **21** 1297-1315 (2007).
- (3) High Friction from a Stiff Polymer using Micro-Fiber Arrays
C. Majidi, R. E. Groff, Y. Maeno, B. Schubert, S. Baek, B. Bush, R. Maboudian, N. Gravish, M. Wilkinson, K. Autumn, R. S. Fearing
Physical Review Letters **97** 076103 (2006).
- (2) Effective elastic modulus of isolated gecko setal arrays
K. Autumn, C. Majidi, R. E. Groff, A. Dittmore, R. Fearing
Journal of Experimental Biology **209** 3558-3568 (2006).
- (1) Attachment of fiber array adhesive through side contact
C. Majidi, R. E. Groff, R. S. Fearing
Journal of Applied Physics **98** 103521 (2005).

Conferences

- (12) Design Principles for Nanopiezoelectric Energy Harvesting
C. Majidi, M. Haataja, D. J. Srolovitz
MRS 2009 Fall Meeting Boston, MA (2009).
- (11) Energy Harvesting with Piezoelectric Nanobrushes: Analysis & Design Principles
C. Majidi, M. Haataja, D. J. Srolovitz
ASME/STLE Int. Joint Tribology Conf. (IJTC) Memphis, TN (2009).
- (10) Adhesion Between Similar and Dissimilar Thin-Walled Micro-Structures
C. Majidi, K. T. Wan
ASME Int. Conf. on Micro- and Nanosystems (MNS) San Diego, CA (2009).
- (9) A Simplified Formulation of Adhesion Problems with Elastic Plates (poster accepted)
C. Majidi, G. G. Adams
Gordon Conf. on the Science of Adhesion New London, NH (2009).
- (8) Theoretical Analysis for the Spontaneous Bending of Piezoelectric Nanoribbons (poster)
C. Majidi, D. J. Srolovitz, M. P. Haataja
MRS 2008 Fall Meeting Boston, MA (2008).
- (7) Effect of Surface Roughness on Adhesion and Friction of Microfibers in Side Contact
M. Teodorescu, C. Majidi, H. Rahnejat, R. S. Fearing
ASME/STLE Int. Joint Tribology Conf. (IJTC) Miami, FL (2008).
- (6) Mechanics of a Novel Shear-activated Microfiber Array Adhesive
C. Majidi, R. S. Fearing
MRS 2008 Spring Meeting San Francisco, CA (2008).
- (5) Friction and Adhesion of Micro-Fiber Arrays (poster)
C. Majidi, R. Groff, S. S. Baek, B. Schubert, R. S. Fearing
Gordon Conference on the Science of Adhesion Tilton, NH (2009).
- (4) Foot design and integration for bioinspired climbing robots
M. Spenko, M. Cutkosky, C. Majidi, R. S. Fearing, R. E. Groff, K. Autumn
Proc. of SPIE, Unmanned Systems Tech. VIII 623019 (2006).
- (3) Compressive Properties of Dense Vertically Aligned Multi-walled Carbon Nanotube Arrays
T. Tong, Y. Zhao, L. Delzeit, C. Majidi, R. E. Groff, P. Reddy, A. Majumdar, A. Kashani,
M. Meyyappan
ASME NANO Conference Berkeley, CA (2005).
- (2) Clumping and Packing of Hair Arrays Manufactured by Nanocasting
C. Majidi, R. E. Groff, R. S. Fearing
ASME IMECE Conference Anaheim, CA (2004).
- (1) Design and construction of a wildfire instrumentation system using networked sensors (poster)
M. M. Chen, C. Majidi, D. M. Doolin, S. Glaser, N. Sitar
Network Embedded Systems Technology Retreat Oakland, CA (2003).

Invited Talks

Bio-Inspired Grasping and Locomotion on Rough Surfaces

Machines & Organisms Seminar, Cornell University, September 2009

Nanostructured Surfaces and Interfaces for Smart Adhesion and Energy Harvesting

Mechanical & Industrial Engineering, Northeastern University, July 2009

Mechanical & Aerospace Engineering, University of Maryland, College Park, June 2009

Spontaneous Bending of Piezoelectric Nanoribbons

Engineering Science & Mechanics, Virginia Tech, April 2009

Computational Materials Science Network, Princeton University, September 2008

Shear-Activated Microfiber Array Adhesive

Mechanical Engineering, Johns Hopkins University, March 2009

Theory Group, Institute of Solid State Research, Forschungszentrum Jülich, August 2008

Lindbergh Lecture, Mechanical Engineering, UW Madison, February 2007

Unpublished Work

Enhanced Friction and Adhesion with Biologically Inspired Fiber Arrays

C. Majidi, Ph.D. Thesis, University of California, Berkeley, May 2007

Mechanics of Gecko Adhesion

C. Majidi, M.S. Thesis, University of California, Berkeley, May 2005

Patent Applications

Symmetric, Spatular Attachments for Enhanced Adhesion of Micro- and Nano-fibers

C. Majidi, R. E. Groff, R. S. Fearing *US Patent & Trademark Office* **20080070002** (2008).

Actively switchable nano-structured adhesive

R. S. Fearing, A. Bachrach, R. E. Groff, C. Majidi *US Patent & Trademark Office* **20080014465** (2008).

Nanostructured friction enhancement using fabricated microstructure

C. Majidi, R. E. Groff, R. S. Fearing *US Patent & Trademark Office* **20060202355** (2006).