Pradeep R. Guduru

James R. Rice Associate Professor of Engineering
Division of Engineering, Brown University, Providence, RI 02912
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Professional Preparation

Sri Venkateswara University, Tirupati, India,	Mechanical Engineering,	B.Tech, 1992
Indian Institute of Science, Bangalore, India,	Aerospace Engineering,	M.E., 1994
California Institute of Technology	Aeronautics (Minor: Materials Science)	Ph.D. 2001

Appointments

James R. Rice Associate Professor of Engineering, Brown University	01/2009 - present
Visiting Research Associate, University of California, Berkeley, CA	08/2008 – 07/2009
Associate Professor of Engineering, Brown University	07/2008 – 12/2008
Assistant Professor of Engineering, Brown University	09/2002 – 06/2008
Postdoctoral Research Associate, Brown University	01/2000 – 08/2002.

Honors

- James R. Rice Associate Professor of Engineering, Brown University, 2009 - present.
- PECASE – Presidential Early Career Award for Scientists and Engineers, 2007.
- National Science Foundation CAREER award, 2006.
- William F. Ballhaus prize for outstanding doctoral dissertation in Aeronautics, CalTech, 2001.
- Ernest E. Sechler Memorial Award for the most significant contributions to teaching and research in Aeronautics, CalTech, 1998.
- Donald W. Douglas fellowship, Graduate Aeronautical Laboratories, CalTech, 1994-95.
- Recipient of Institute's *Senate Commendation* for academic excellence, Indian Institute of Science, 1994.
- Ivaturi prize and Jayant Dalal scholarship for the best academic performance, Sri Venkateswara University, 1991 and 1992, respectively.

Publications

1. J.F.Waters, H.J. Gao, P.R. Guduru, "On Adhesion Enhancement due to Concave Surface Geometries." Accepted for publication in The Journal of Adhesion, 2010.
2. V.A. Sethuraman, M.J. Chon, M. Shimshak, V. Srinivasan, P.R. Guduru, "In Situ Measurements of Stress Evolution in Silicon Thin Films during Electrochemical Lithiation and Delithiation", J. Power Sources 195, 5062-5066, 2010.
3. V.A. Sethuraman, V. Srinivasan, A.F. Bower, P.R. Guduru, In situ Measurements of Stresspotential Coupling in Lithiated Silicon", J. Electrochem. Soc., in press (2010).
4. A.F. Bower, P.R. Guduru, V.A. Sethuraman, "A Finite Strain Model of Stress, Diffusion, Plastic Flow and Electrochemical Reactions in a Lithium-ion Half-cell", Submitted to J. Mechanics and Physics of Solids (2010).
5. V.A. Sethuraman, M. Shimshak, M.J. Chon, N. Van Winkle, P.R. Guduru, "In Situ Measurement of Biaxial Modulus of Si Anode for Li-ion Batteries", To appear in Electrochemistry Communications (2010).
6. J.F. Waters, P.R. Guduru. Mode-mixity-dependent adhesive contact of a sphere on a plane surface. Proceedings of the Royal Society of London, A., 466: 1303-1325 (2010).
7. Middleton KM, Goldstein BD, Guduru PR, et al. Variation in within-bone stiffness measured by nanoindentation in mice bred for high levels of voluntary wheel running Journal of Anatomy, 216 (1): 121-131, 2010.

8. J.F. Waters, S. Lee, P.R. Guduru. Mechanics of axisymmetric wavy surface adhesion: JKR-DMT transition solution. *International Journal of Solids and Structures* 46: 1033-1042, 2009.
9. H. Yao, S. Chen, P.R. Guduru, H. Gao. Orientation-dependent adhesion strength of a rigid cylinder in non-slipping contact with a transversely isotropic half-space. *International Journal of Solids and Structures* 46: 1167-1175, 2009.
10. H. Yao, P.R. Guduru, H.J. Gao. Maximum strength for intermolecular adhesion of nanospheres at an optimal size. *Journal of the Royal Society of Interface* 5: 1363-1370, 2008.
11. J.M. Johnson, P.R. Guduru, K. Myers, et al. Measurement of the stress relaxation response to tension in the pregnant rat cervix, *Reproductive Sciences*, 15 (2) p. 263A-263A, 2008.
12. V. Gill, P.R. Guduru and B.W. Sheldon. Electric Field Induced Surface Diffusion and Micro/Nano-scale Island Growth. *International Journal of Solids and Structures*. 45: 943-958. 2008.
13. H. Yao, G. Della Rocca, P.R. Guduru and H. Gao. Adhesion and Sliding Response of a Biologically Inspired Fibrillar Surface: Experimental Observations. *Journal of the Royal Society Interface*. 5: 723-733, 2008.
14. Z. Xia, P.R. Guduru and W. Curtin. Enhancing Mechanical Properties of Multi-Wall Carbon Nanotubes via sp^3 Inter-wall Bridging. *Physical Review Letters* 98: Art. No. 245501, 2007.
15. P.R. Guduru. Detachment of a Rigid Solid from a Wavy Elastic Surface - Theory. *Journal of the Mechanics and Physics of Solids* 55: 445-472, 2007.
16. P.R. Guduru and C.Bull. Detachment of a Rigid Solid from a Wavy Elastic Surface - Experiments. *Journal of the Mechanics and Physics of Solids* 55: 473-488, 2007.
17. P.R. Guduru and Z. Xia. Experiments and Analysis of Buckling in Imperfect Multiwalled Carbon Nanotubs (Invited contribution to a special volume on novel testing techniques at nanoscale). *Experimental Mechanics* 47: 153-161, 2007.
18. K.M. Middleton, T. Garland, B.D. Goldstein, P.R. Guduru, S.A. Kelly, S.M. Swartz. Within-bone variation in stiffness measured by nanoindentation in high-running mice. *Integrative and Comparative Biology* 46: E98-E98, 2006.
19. J.F. Waters, P.R. Guduru and J.M Xu. Nanotube Mechanics – Recent Progress in Shell Buckling Mechanics and Quantum Electromechanical Coupling. *Composites Science and Technology*. 66: 1141-1150, 2006.
20. P.R. Guduru, M. S. Bharathi and L.B. Freund. The Influence of a Surface Coating on the High Rate Fragmentation of a Ductile Material. *International Journal of Fracture*, 137 (1-4): 89-108, 2006.
21. J.F. Waters, P.R. Guduru, T. Hanlon, M. Jouzi, J.M. Xu and S. Suresh. Shell Buckling of Individual Multi-walled Carbon Nanotubes Using Nanoindentation. *Applied Physics Letters* 87: 103109. 2005.
22. J.F. Waters, L. Riester, M. Jouzi, P.R. Guduru and J.M. Xu. "Buckling instabilities in multiwalled carbon nanotubes under uniaxial compression." *Applied Physics Letters,* 85: 1787-1789, 2004.
23. P.R. Guduru, E. Chason and L.B. Freund, "Mechanics of compressive stress evolution during thin film growth," *Journal of the Mechanics and Physics of Solids* 51: 2127-2148. 2003.
24. P.R. Guduru and L.B. Freund, "The Dynamics of Multiple Neck Formation and Fragmentation in Ductile Metals," *International Journal of Solids and Structures* 39: 5615-5632, 2002.
25. P.R. Guduru, G. Ravichandran and A.J. Rosakis, "Observations of Transient High Temperature Vortical Microstructures in Solids during Adiabatic Shear Banding," *Physical Review* E, 64: 036128-1, 2001.
26. P.R. Guduru, A.T. Zehnder, A.J. Rosakis and G. Ravichandran, "Dynamic Full Field Measurements of Crack Tip Temperatures," *Engineering Fracture Mechanics*, 68: 1535-1556, 2001.
27. P.R. Guduru, A.J. Rosakis, and G. Ravichandran, "Dynamic Shear Bands: An Investigation Using High Speed Optical and Infrared Diagnostics," *Mechanics of Materials*, 33: 371-402, 2001.
28. S. Li, W-K. Liu, D. Qian, P.R. Guduru and A.J. Rosakis, "Dynamic Shear Band Propagation and Micro-structure of Adiabatic Shear Band," *Computer Methods in Applied Mechanics and Engineering* 191: 73-92, 2001.

29. A.Venkert, P.R. Guduru and G. Ravichandran, “Effect of Loading Rate on Fracture Morphology in a High Strength Ductile Steel,” *Journal of Engineering Materials and Technology*, 123: 261-267, 2001.
30. A.Pandolfi, P.R. Guduru, M. Ortiz and A.J. Rosakis, “Three Dimensional Cohesive-Element Analysis and Experiments of Dynamic Fracture in C300 Steel”, *International Journal of Solids and Structures*, 37: 3733-3760, 2000.
31. A.Venkert, P.R. Guduru and G. Ravichandran, “An Investigation of Dynamic Failure in 2.3Ni-1.3Cr-0.17C Steel,” *Materials Transactions A,* 31: 1147-1154, 2000.
32. A.T. Zehnder, P.R. Guduru, A.J. Rosakis and G. Ravichandran, “Million Frames per Second Infrared Imaging System”, *Review of Scientific Instruments*, 71: 3762-3768, 2000.
33. P.R. Guduru, R.P. Singh, G. Ravichandran and A.J. Rosakis, “Dynamic Crack Initiation in Ductile Steels”, *Journal of the Mechanics and Physics of Solids,* 46: 1997-2016, 1998.

Invited lectures

1. Invited talk. NASA Glenn Space Center, December 2010.
2. Invited talk. Division of Engineering and Applied Sciences, Harvard University, December 2010.
3. Invited talk, Department of Mechanical Engineering, Indian Institute of Science, Bangalore, 8/2010.
4. Invited talk. General Motors India Science Lab, Bangalore, India, 8/2010.
5. Invited talk, Department of Physics, Indian Institute of Technology, Madras, India. 8/2010.
6. Invited talk. Influence of mode mixity and surface roughness on adhesion of soft materials. GALCIT 80 – Symposium. California Institute of Technology, September, 2008.
7. Invited talk. *International Union of Theoretical and Applied Mechanics* Symposium on Modelling Nanomaterials and Nanosystems, Aalborg, Denmark. May 2008.
8. Seminar speaker, Department of Engineering Physics, *University of Wisconsin*, Madison, February 2008.
9. Seminar speaker, Department of Mechanical Engineering, *University of Pennsylvania*, April, 2008.
10. Seminar speaker, Department of Mechanical Engineering, *Stanford University*, May 2008.
11. Invited speaker, *Thin Air Philosophical Society* Meeting: Challenges in Mechanics of Materials. Boulder, CO. August 2007.
12. Seminar speaker, Department of Theoretical and Applied Mechanics, *Cornell University*. May 2007.
13. Seminar speaker, Department of Mechanical Engineering, *Northeastern University*, December 2006.
14. Invited speaker, Princeton Center for Complex Materials: Workshop on Recent Progress in Nanoscale Contact Mechanics. *Princeton University*. October 2006.
15. Invited speaker, US-Korea Joint Workshop on Nano-Mechanics. *University of California, Los Angeles*. August 2006.
16. Invited speaker, Alan Needleman-Viggo Tvergaard Symposium. *Brown University*, August, 2006.
17. Seminar speaker, Department of Mechanical Engineering, *Massachusetts Institute of Technology*, Cambridge, MA. April 2006.
18. Seminar speaker, Department of Mechanical Engineering, *Northeastern University*, December 2006.
19. Invited speaker, Mindlin Symposium. US *National Congress of Theoretical and Applied Mechanics*. Boulder, CO. June 2006.
20. Invited speaker, Symposium on Biologically Inspired Structures. *US National Congress of Theoretical and Applied Mechanics*. Boulder, CO. June 2006.
21. Invited speaker, Symposium on Bio and Nano Mechanics. Society for Engineering Science Annual Meeting, *Penn State University*. August, 2006.

22. Invited speaker, 15th International Invitational Symposium on *Unification Of Analytical, Computational, And Experimental Solution Methodologies In MEMS And Nanotechnology.* Springfield, MA. November, 2004.
23. Seminar speaker, Department of Mechanical Engineering, *Tufts University*. November 2004.
24. Invited speaker, GALCIT 75th Anniversary special symposium on current trends in solid mechanics, *California Institute of Technology*. November, 2003.
25. Seminar speaker, Department of Mechanical Engineering, *University of Rhode Island*. March, 2003.
26. Invited speaker, Ben Freund 60th Birthday symposium on Mechanics of Materials, *California Institute of Technology*, January 2003.
27. Seminar speaker, Department of Aeronautics and Astronautics, *Massachusetts Institute of Technology*, Cambridge, MA. April, 2002.
28. Seminar speaker, Department of Aeronautics and Astronautics, *University of Illinois at Urbana Champaign*, Urbana, IL. April, 2002.
29. Seminar speaker, Division of Engineering, *Brown University*, Providence, RI. April, 2002.
30. Seminar speaker, Department of Mechanical Engineering and Engineering Mechanics, *Michigan Technological University*, Houghton, MI. April, 2002.
31. Seminar speaker, Department of Mechanical, Aerospace and Nuclear Engineering, *Rensselaer Polytechnic Institute*, Troy, NY. March, 2002.
32. Seminar speaker, Department of Mechanical Engineering, *University of California, Riverside*, CA. March, 2002.
33. Seminar speaker, Department of Mechanical Engineering, *University of South Carolina*, Columbia, SC. February, 2002.
34. Seminar speaker, Department of Mechanical Engineering, *Duke University*, Durham, NC. February, 2002.
35. Seminar speaker, Department of Theoretical and Applied Mechanics, *Cornell University*, Ithaca, NY. October, 2001.
36. Seminar speaker, Department of Mechanical Engineering, *University of Rochester*, Rochester, NY. October, 2001.
37. Seminar speaker, Division of Engineering, *Brown University*, Providence, RI. September, 2001.
38. Seminar speaker, Department of Mechanical Engineering, *Indian Institute of Science*, Bangalore, India. August, 2001.

Abstracts and contributed talks (2003 – 2009)

1. P.R. Guduru. Mechanics aspects of Energy Storage Materials. NASA Battery Workshop, Huntsville, AL. 11/2010.
2. P.R.Guduru, V.A.Sethuraman, M.J.Chon, M.Shimshak. In situ stress measurements in Li-ion battery materials. Materials Research Society, 11/2010.
3. P.R.Guduru, V.A.Sethuraman, M.J.Chon, M.Shimshak. In situ stress measurements in Li-ion battery materials. Society for Engineering Science, 10/2010.
4. J.F. Waters and P.R. Guduru. ASME Applied Mechanics and Materials Conference, Boston, MA. 2008.
5. P.R. Guduru, J.F.Waters et al. Adhesion Society Conference, Seattle, WA, 2008.
6. Johnson J., Guduru P.R., Myers K, Socrate S, House M, Ji H, Long V, Chien EK. Measurement of the stress relaxation response to tension in the pregnant rat cervix. *Society for Gynecologic Investigation Annual Meeting*, 2007.
7. P.R. Guduru and J.F. Waters. ASME Applied Mechanics and Materials Conference McMat 2007, Austin, TX, June 2007.
8. P.R. Guduru, H. Yao, G. Della Rocca. ASME Applied Mechanics and Materials Conference McMat 2007, Austin, TX, June 2007.
9. P.R. Guduru and V. Gill. ASME Applied Mechanics and Materials Conference McMat 2007, Austin, TX, June 2007.
1. P.R. Guduru and J.F. Waters. Adhesion Society Conference. Tampa, FL. February 2007.

2. P.R. Guduru. Mechanics of Wavy Surface Adhesion. American Society of Mechanical Engineers. Chicago, IL. November 2006.
3. P.R. Guduru and S. Lee. Detachment of a Rigid Solid from a Wavy Elastic Surface. Society for Experimental Mechanics. St. Louis, MO. June 2006.
4. P.R. Guduru and J.F. Waters. Geometry Induced Friction Anisotropy in Biological Systems. Society for Experimental Mechanics. St. Louis, MO. June 2006.
5. P.R. Guduru. Mechanics of Wavy Surface Adhesion. ASME Winter Annual Meeting. Chicago. November, 2006.
6. P.R. Guduru. Adhesion of a wavy surface. McMat 2005 Joint ASME/ASCE/SES Conference on Mechanics and Materials, June 1-3, 2005. Baton Rouge, LA.
7. P.R. Guduru and V. Gill. Magnetic field induced surface diffusion and nanoscale surface sculpting. McMat 2005 Joint ASME/ASCE/SES Conference on Mechanics and Materials, June 1-3, 2005. Baton Rouge, LA.
8. P.R. Guduru, J.F. Waters and J.M. Xu. Uniaxial compression buckling of multiwalled carbon nanotubes. McMat 2005 Joint ASME/ASCE/SES Conference on Mechanics and Materials, June 1-3, 2005. Baton Rouge, LA.
9. P.R. Guduru, Y. F. Gao. Adhesion of a wavy surface. Society for Experimental Mechanics Annual Conference, Portland, OR. June 2005.
10. P.R. Guduru and V. Gill. Magnetic field induced surface diffusion and nanoscale surface sculpting. McMat 2005 Society for Experimental Mechanics Annual Conference, Portland, OR. June 2005.
11. P.R. Guduru, J.F. Waters and J.M. Xu. Uniaxial compression buckling of multiwalled carbon nanotubes. Society for Experimental Mechanics Annual Conference, Portland, OR. June 2005.
12. P.R Guduru and B.W. Sheldon V. Gill. “Magnetic field induced surface diffusion.” ASME Winter annual conference, Anaheim, CA. November 2004.
13. J.F. Waters, L. Riester, M. Jouzi, T. Hanlon, P.R. Guduru, J.M. Xu and S. Suresh. “Mechanics of Multi-Walled Carbon Nanotubes under Compression.” ASME Winter annual conference, Anaheim, CA. November 2004.
14. P.R. Guduru**,** E. Chason and L.B. Freund, “Mechanics of Compressive Stress Evolution during Thin Film Growth,” Society for Experimental Mechanics Annual conference, Rayleigh, NC, June 2003.
15. P.R. Guduru and L.B. Freund, “The Dynamics of Multiple Neck Formation and Fragmentation in,” Society for Experimental Mechanics Annual conference, Rayleigh, NC, June 2003.
16. P.R. Guduru**,** E. Chason and L.B. Freund, “Mechanics of Compressive Stress Evolution,” Materials Research Society, San Francisco, April 2003.

Service

(a) University

- Mechanical Engineering Concentration Advisor, School of Engineering, Brown University, 2010 – present.
- Member of the committee on undergraduate curriculum to examine *Engineering Core* (2009-present).
- Organizer of Solid Mechanics/Materials Science seminar series (01/2003 – 05/2006).
- Sciences library liaison for the Division of Engineering (09/2005 – 08/2008).
- Served on a number of Brown internal proposal selection committees constituted by the Vice President for Research.
- Served on the Ph.D. and M.S. examination committees, preliminary and qualifying examination committees and B.S. Honors thesis committees of several students in Solid Mechanics, Materials Science and Biomedical Engineering.
- Freshman and sophomore advisor (2004-present).

(b) Profession

- Proposal Review Panelist for National Science Foundation, Department of Energy, Department of Defense, Israel Science Foundation, Rhode Island EPSCoR.
- Book Reviewer for Elsevier.
- External examiner (Ph.D.), Indian Institute of Science, Bangalore, India.
- Organized several symposia at ASME, SEM and SES technical conferences
- Refereed for : Journal of the Mechanics and Physics of Solids, Proceedings of the National Academy of Sciences, Journal of the Royal Society Interface, Journal of Materials Science, Modeling and Simulation in Materials Science and Engineering, Experimental Mechanics, International Journal of Fracture, International Journal of Solids and Structures, Journal of the Mechanics of Materials and Structures, Journal of Applied Physics, Journal of Applied Mechanics, Physics Letters A, Mechanics of Materials, Journal of Composites Science and Technology, Nanotechnology, Applied Physics Letters, Engineering Fracture Mechanics, Soft Matter.

Teaching

Undergraduate courses

- EN0040: Dynamics and Vibrations (freshman course)
- EN 0310: Mechanics of Solids and Structures (sophomores and juniors)
- EN 1750: Advanced Mechanics of Solids (juniors and seniors)

Graduate courses

- EN 2260: Stress Waves in Solids
- EN 2320: Experimental Mechanics
- EN 2380: Mechanics of Fracture