

Nikhil Chandra Admal

University of California Los Angeles, Department of Materials Science and Engineering
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Employment

University of California, Los Angeles, California

- Sep 2014–Present **Postdoctoral Research Scholar**, Materials Science and Engineering
Supervisor: Jaime Marian
- ▶ Continuum modeling of recrystallization in refractory materials - Tungsten
 - ▶ Grain boundary-mediated plasticity in nanocrystalline materials
 - ▶ Atomistic representations of strain gradient elasticity tensors
- Sep 2013–Dec 2013 **Visiting Research Scholar**, Institute for Pure and Applied Mathematics

Education

The University of Minnesota, Minneapolis, MN, 2007–2014

- Sep 2014 **Ph.D. Aerospace Engineering and Mechanics**, GPA: 3.917
Dissertation: Results on the interaction between atomistic and continuum models
Advisor: Ellad B. Tadmor
- Dec 2011 **M.S. Mathematics**
Concentration in Real and Functional analysis
- Aug 2010 **M.S. Aerospace Engineering and Mechanics**
Dissertation: A unified interpretation of stress in molecular systems
Advisor: Ellad B. Tadmor
- Indian Institute of Technology (IIT) Madras, Chennai, TN, India, 2001–2006
- Aug 2006 **B.Tech., M.Tech. Dual Degree in Mechanical Engineering**
Minor: Vibrations Concepts and Applications
Thesis: Conjugate heat transfer through conical pipes and Optimization of functionally graded materials in circular pipe
Advisor: N. Ganesan

Research and Teaching Interests

- Research:* Severe plastic deformation - recovery, recrystallization and grain growth, Nanocrystalline alloys, Microscopic foundations of continuum mechanics and gradient elasticity, Multiscale modeling and simulation of materials, Numerical analysis of multiscale modeling
- Teaching:* Statics and particle dynamics, Mechanics of solids, Continuum mechanics, Linear elasticity, Nonlinear elasticity, Multiscale modeling of materials

Teaching Experience

University of California Los Angeles,

- May 2015 **Taught 2 two-hour sessions**, Materials Science and Engineering
MSE298 Numerical Methods to Study Materials Behavior across Multiple Length and Time Scales

Previous Employment

The University of Minnesota, Minneapolis, MN

Sep 2007–Sep 2012 **Graduate Student Research Assistant**

- ▶ Investigated the microscopic foundations of continuum mechanics which play a central role in multiscale methods involving the interaction of atomistic and continuum models. In particular, I have extensively studied the definitions of stress and heat flux for atomistic systems.

Jan 2007–May 2007 **Graduate Student Teaching Assistant**

- ▶ Delivered recitations for 2 classes of 30 students each.
- ▶ Prepared and graded examinations and homework assignments for the courses Deformable Body Mechanics and Aerospace Structures.

Indian Institute of Technology (IIT) Madras, Chennai, TN, India

Aug 2005–Apr 2006 **Graduate Research Assistant**

- ▶ Study of conjugate heat transfer in conical pipes and the design of functionally graded materials to minimize thermal stresses.

Micro and Nano Structure Technology Lab, GE: John F. Welch Technology Center, Bangalore, Karnataka, India

Apr 2005–Jul 2005 **Intern**

- ▶ Designed a differential pressure-based MEMS flow sensor for anaesthesia delivery systems by modeling the fluid structure interaction in this device using ANSYS and COVENTOR.
- ▶ Developed a Surface Plasmon Resonance (SPR) sensor for sensing analytes like phosphates in water, and elemental mercury in power plants.

Honors and Awards

- 2016 *Institute for Digital Research and Education (IDRE) Postdoctoral Fellowship-\$9000*, University of California Los Angeles, CA
- 2012–2013 *Doctoral Dissertation Fellowship*, University of Minnesota, Minneapolis, MN
- 2007 *Summer Fellowship*, Aerospace Engineering and Mechanics, Minneapolis, MN
- 2005 *Inventor Bonus Award*, GE: John F. Welch Technology Center, Bangalore, India
- 2005 *Best Outgoing Intern*, awarded by GIPLO Lab, GE: John F. Welch Technology Center, Bangalore, India
- 2004 *Percentile of 98.19 in Graduate Aptitude Test in Engineering (GATE) 2004*, India
- 2001–2005 *Pratibha scholarship*, State government of Andhra Pradesh, India
- 2001 *Ranked 1081 in IIT Joint Entrance Examination among over 200,000 aspirants*

Travel Grants

MMM 2016	<i>From the organizers of the 8th International Conference on Multiscale Materials Modeling, Dijon, France</i>
USACM 2016	<i>USACM Workshop on Recent Advances in Computational Methods for Nanoscale Phenomena, Ann Arbor, MI</i>

Journal Articles

- 1 N. C. Admal, E. B. Tadmor. “A unified interpretation of stress in molecular systems.” *Journal of Elasticity*, 100:63–143, 2010
- 2 N. C. Admal, E. B. Tadmor. “Stress and heat flux for arbitrary multibody potentials: A unified framework.” *The Journal of Chemical Physics*, 134:184,106, 2011
- 3 Nikhil Chandra Admal, E.B. Tadmor. “The non-uniqueness of the atomistic stress tensor and its relationship to the generalized beltrami representation.” *Journal of the Mechanics and Physics of Solids*, 93:72 – 92, 2016. Special Issue in honor of Michael Ortiz
- 4 Nikhil Chandra Admal, Ellad B Tadmor. “Material fields in atomistics as pull-backs of spatial distributions.” *Journal of the Mechanics and Physics of Solids*, 89:59–76, 2016
- 5 N. C. Admal, J. Marian, Giacomo Po. “The atomistic representation of first strain-gradient elastic tensors.” *Journal of the Mechanics and Physics of Solids*, 99:93 – 115, 2017
- 6 Nikhil Chandra Admal, Giacomo Po, Jaime Marian. “Diffuse-interface polycrystal plasticity: Expressing grain boundaries as geometrically necessary dislocations.” *Materials Theory*, 1(1):6, 2017
- 7 G. Po, M. Lazar, D. Seif, N. C. Admal, N. Ghoniem. “A non-singular theory of dislocations in anisotropic crystals.” *International Journal of Plasticity*, 2017. Accepted for publication
- 8 N. C. Admal, G. Po, J. Marian. “A unified framework for polycrystal plasticity with grain boundary evolution.” *arXiv preprint arXiv:1709.10176*, 2017. Accepted to International Journal of Plasticity
- 9 N. C. Admal, J. Marian. “Dislocation pattern formation and subgrain nucleation during dynamic recovery.” *Physical Review Letters*, 2017. In preparation
- 10 N. C. Admal, M. Shi, J. Tadmor. “Visualization of the atomistic stress tensor using a discrete Helmholtz–Hodge decomposition.” 2018. In preparation

Technical Publications

- 1 Nikhil Chandra Admal. *A unified interpretation of stress in molecular systems*. Master’s thesis, University of Minnesota, Department of Aerospace Engineering and Mechanics, Minneapolis, MN 55455, 2010
- 2 Nikhil Chandra Admal. *Results on the interaction between atomistic and continuum models*. Ph.D. thesis, University of Minnesota, Department of Aerospace Engineering and Mechanics, Minneapolis, MN 55455, 2014

Invited Talks

- 1 “The non-uniqueness of the atomistic stress tensor and its relationship to the generalized Beltrami representation.” Fifteenth Pan-American Congress of Applied Mechanics, Champaign, IL, May 2015
- 2 “The atomistic representations of strain gradient elasticity tensors.” 2nd Schöntal Symposium: Dislocation based Plasticity, Schöntal, Germany, February 2016
- 3 “Bridging atomistic, mesoscale and continuum models for materials.” Department of Mechanical Engineering, University of Houston, Houston, TX, April 2016

- 4 “Grain growth in dynamic recrystallization.” Department of Mechanical Engineering, Massachusetts Institute of Technology, Cambridge, MA, March 2017
- 5 “Grain growth in dynamic recrystallization.” School of Engineering, Brown University, Providence, RI, March 2017
- 6 “Plasticity in extreme environments: Recrystallization and grain growth.” Department of Mechanical Engineering, State University of New York at Buffalo, Buffalo, NY, March 2018

Technical Presentations

- 1 “A unified interpretation of stress in molecular systems.” 16th U.S. National Congress of Theoretical and Applied Mechanics, University Park, PA, June 2010
- 2 “Interatomic potentials, forces and the stress tensor.” Future directions in mechanics research, NSF workshop and symposium in honor of Professor L. B. Freund, Providence, RI, June 2011
- 3 “Stress and heat flux for arbitrary multibody potentials.” 11th U.S. National Congress on Computational Mechanics, Minneapolis, MN, July 2011
- 4 “Interatomic potential energy representation and the atomistic stress tensor.” Society for Engineering and Science, Providence, RI, July 2013
- 5 “Interatomic potential energy representation and the atomistic stress tensor.” Graduate Aerospace Laboratories, Caltech, CA, August 2013
- 6 “Interpretation of stress in molecular systems.” Institute for Pure and Applied Mathematics, UCLA, CA, November 2013
- 7 “A decomposition of the atomistic stress into an elastic and a residual component.” Society for Natural Philosophy Meeting: Mathematics and Mechanics in the Physical Sciences, A Tribute to James Serrin, University of Minnesota, November 2013
- 8 “The elastic-plastic decomposition of the atomistic stress tensor.” The Minerals, Metals and Materials Society, San Diego, CA, February 2014
- 9 “Referential continuum fields in atomistics.” 13th US National Congress on Computational Mechanics, San Diego, CA, 2015
- 10 “A diffuse-interface elasto-plastic model to study grain boundary evolution.” 8th International Conference on Multiscale Materials Modeling, Dijon, France, October 2016
- 11 “Polycrystal plasticity with grain boundary evolution.” Centre Européen de Calcul Atomique et Moléculaire (CECAM), Lugano, Switzerland, February 2017

Book Chapters

- 1 N. C. Admal, E. B. Tadmor. *Statistical mechanics, molecular modeling, and the notion of stress*, chapter A unified interpretation of stress in molecular systems. Springer, New York, 2010

Patents

- 1 Nikhil C. Admal, Parag Thakre, Atanu Phukan, Sriharsha Aradhya. *MEMS flow sensor*. Number US 7337678 B2. Issued March 2008

Professional Service Activities

Technical Conference Activities

USNCCM 2015	Symposium co-organizer, Atomistic computation of continuum quantities
MMM 2018	Symposium co-organizer, Crystal plasticity and discrete defect mechanics
Knowledgebase of Interatomic Models (http://openkim.org)	
2012–Present	Contributor
	I am an active contributor to the KIM repository of interatomic potentials and tests.

Students Mentored

Undergraduate

Feng Cao	Materials Science and Engineering, Univeristy of California Los Angeles. Thesis title: <i>Calculation of grain boundary energies using atomistics</i> In preparation
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Software

- 1 *MDStressLab version 1.0.0*, Released: September 2015. URL <http://mdstresslab.org>. N. C. Admal, E. B. Tadmor

Relevant Skills

Software: Unix/Linux, Windows, Matlab, Comsol, Mathematica, perl, Fortran, C, C++, L^AT_EX, B_IB_TE_X, Asymptote, GNUplot, ANSYS, AutoCad

References

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