Harshad Paranjape, Ph.D.

Northwestern University
2145 Sheridan Rd Room B224 Evanston IL 60208

Education

- **Doctor of Philosophy (Ph.D.)** in Materials Science and Engineering *[2012-2014]*
  The Ohio State University, Columbus, OH, USA.
  Dissertation: Modeling of Shape Memory Alloys: Phase Transformation/Plasticity Interaction at the Nano Scale and the Statistics of Variation in Pseudoelastic Performance
  Dissertation committee: Prof. Peter Anderson, Prof. Michael Mills, Prof. Yunzhi Wang
- **Master of Science** (M.S.) in Materials Science and Engineering *[2009-2012]*
  The Ohio State University, Columbus, OH, USA.
- **Bachelor of Technology** (B.Tech.) in Metallurgical Engineering and Materials Science *[2005-2009]*
  Indian Institute of Technology Bombay, Mumbai, India

Research Experience

- **Visiting post-doctoral Scholar at Northwestern University** *[2014-ongoing]*
  Post-doctoral Scholar at Colorado School of Mines
  PI: Prof. L. Catherine Brinson and Prof. David Dunand (Northwestern University)
  Mentor: Prof. Aaron Stebner (Colorado School of Mines)
  - Main project: Utilizing high energy diffraction microscopy and coupled micromechanics-based modeling to characterize phase transformation at grain scale in shape memory alloys
  - Designed and performed high-energy X-ray diffraction experiments to reconstruct grain-scale progression of phase transformation in Ni-Ti shape memory alloys.
  - Mentored one graduate student at Colorado School of Mines in developing a forward-modeling approach coupled with high energy X-ray diffraction to reconstruct phase transformation microstructure in single crystal shape memory alloys
  - Mentored one graduate student at Northwestern University in characterizing how micron-scale features affect progress of phase transformation in polycrystalline shape memory alloys.
  - Other project: Implemented a macro-scale material constitutive law coupling phase transformation and plasticity in ABAQUS finite element framework and investigated effect of multi-axial loading on shape memory performance

- **Graduate Research Associate at The Ohio State University** *[2009-2014]*
  - Main project: Modeling the “competition” between phase transformation and plasticity in shape memory alloys.
  - Developed a new approach based on the phase field method and crystal plasticity to model phase transformation-slip interaction in shape memory alloys.

- Developed a predictive model for the effect of inter-granular constraint on grain-scale performance in shape memory alloy.
- Other project: Initiated an effort to automatically identify individual fibers from images of polymer scaffolds and generate an optimized finite element model with hyperelastic constitutive law.

- **Undergraduate Research at Indian Institute of Technology Bombay** *[2008-2009]*
  - Developed a set of image processing approaches to quantify morphological aspects of crystal orientation distribution in deformed Al alloys using electron backscatter diffraction imagery.

Teaching Experience and Training

- **Colorado School of Mines** *[ongoing]*
  - **Teaching MEGN 517: *Inelastic Constitutive Relations* Spring 2016**: In the process of developing a curriculum introducing the students to a variety of approaches for modeling phase transformation, twinning and plasticity in materials. Additionally the curriculum emphasizes coupling modeling with experimental approaches like diffraction and digital image correlation to obtain higher-impact results.
  - **Co-instructed *Introduction to Solid Mechanics* Autumn 2015**: Graduate core course.
- **The Ohio State University**
  - Scholarship to participate in the 2nd Summer School for Integrated Computational Materials Education at University of Michigan, Ann Arbor, MI, USA in Summer 2012.
  - Took initiative in developing Matlab-based graphical demonstrations of basic materials science principles like phase change and plasticity to aid senior undergraduate students in computational materials science classes.

Peer-reviewed Journal Publications

Published

1. Stebner, A. P., **Paranjape H**., Clausen B., Brinson L. C., & Pelton A. R. (2015). In Situ Neutron Diffraction Studies of Large Monotonic Deformations of Superelastic Nitinol, *Shape Memory and Superelasticity*
2. **Paranjape, H**., Anderson, P. M. (2014). Texture and Grain Neighborhood Effects on Ni-Ti Shape Memory Alloy Performance, *Modeling and Simulation in Materials Science and Engineering*.
3. Ebersole, G. C., **Paranjape, H**., Anderson, P. M., & Powell, H. M. (2012). Influence of hydration on fiber geometry in electrospun scaffolds. *Acta Biomaterialia*.
4. Raveendra, S., Kanjarla, A., **Paranjape, H.**, Mishra, S., Delannay, L., Samajdar, I., & Van Houtte, P. (2011). Strain Mode Dependence of Deformation Texture Developments: Microstructural Origin. *Metallurgical and Materials Transactions A*.
5. Raveendra, S., **Paranjape, H.**, Mishra, S., Weiland, H., Doherty, R. D., & Samajdar, I. (2009). Relative Stability of Deformed Cube in Warm and Hot Deformed AA6022: Possible Role of Strain-Induced Boundary Migration. *Metallurgical and Materials Transactions A*

Under peer-review

1. **Paranjape, H.**, Manchiraju S., Anderson, P. M. (2015). A Phase Field/Finite Element Approach to Model Coupled Phase Transformation and Plasticity in Shape Memory Alloys, *Submitted to International Journal of Plasticity.*

Selected Conference Presentations

1. **Paranjape H.**, Bucsek A., Paul P., Park J-S., Sharma H., Dale D., Stebner A. P., Dunand D., Brinson L. C., *A Grain Scale Analysis of Phase Transformation in Shape Memory Alloys – A Coupled Synchrotron X-ray Diffraction and Micromechanical Modeling Study*, ESOMAT 2015, Antwerp, Belgium, September 13-17, 2015
2. **Paranjape H.**, Park J-S., Sharma H., Stebner A. P., Brinson L. C., *Effect of Granular Constraints on Phase Transformation in Shape Memory Alloys – A Coupled Synchrotron X-ray Diffraction and Micromechanical Modeling Study*, Denver X-ray Conference, Denver CO, August 6, 2015
3. **Paranjape H.**, Anderson P. M., *A Phase Field/Finite Element Approach to Model Phase Transformation and Plasticity in Shape Memory Alloys*, US National Congress on Theoretical and Applied Mechanics, East Lansing, MI, June 17, 2014
4. Paranjape H., Anderson P. M., *A Phase Field/Finite Element Approach to Model Coupled Phase Transformation and Plasticity in Shape Memory Alloys*, Shape Memory Science and Technology Annual Meeting, Monterey, CA, May 16-20, 2014
5. **Paranjape H.**, Manchiraju S., Anderson P. M., *A Phase Field/Finite Element Model to Simulate Plasticity and Martensitic Phase Transformation in Shape Memory Alloys*, TMS Annual Meeting, San Diego CA, February 16-20, 2014
6. **Paranjape H.**, Manchiraju S., Gao Y., Wang Y., Anderson P. M., *A Finite Element/Phase Field Approach to Study Martensitic Phase Transformation in Shape Memory Alloys*, TMS Annual Meeting, San Antonio TX, March 3-7, 2013

Poster Presentation

1. **Paranjape H.**, Anderson P. M., *A Phase Field/Finite Element Model to Simulate Martensitic Phase Transformation in Shape Memory Alloys*, Physical Metallurgy Gordon Research Conference, Biddeford ME, July 28-August 3, 2013