

Shailendra P. Joshi

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EDUCATION

Ph.D.	Civil Engineering	Indian Institute of Technology Bombay (India)	2002
M.E.	Structural Engineering	University of Pune (India)	1996
B.E.	Civil Engineering	University of Pune (India)	1995

PROFESSIONAL EXPERIENCE

Assistant Professor	Mechanical Engineering, National University of Singapore	June 08-present
Faculty Associate	Engineering Science Program, National University of Singapore	June 08-present
Visiting Assistant Professor	Mechanical Engineering, Johns Hopkins University (USA)	June 08-present
Post-Doctoral Fellow	Mechanical Engineering, Johns Hopkins University (USA)	May 05- May 08
Mechanical Engineer	GE-India Technology Center (India)	July 03- May 05
Structural Design Associate	Composites Design and Technology (India)	Jan. 03-June 03
Visiting Scientist	Universität Stuttgart (Germany)	May 02-Nov. 02
Research Assistant	Indian Institute of Technology-Bombay (India)	Dec. 98-Aug. 02
Project Engineer	Engineering Mechanics Research (India) Pvt. Ltd.	Dec. 97- Dec. 98
Structural Design Engineer	Delcons Structural Consultants (India)	Aug. 96-Dec. 97

AWARDS AND HONORS

Six Sigma Green Belt Certification	GE-India Technology Center (India)	2004
Fellowship Under Fast Track Proposals for Young Scientists	Department of Science and Technology, (India)	2003
Deutsches Zentrum für Luft und Raumfahrt (DLR) Fellowship	Universität Stuttgart (Germany)	2002

PUBLICATIONS AND PRESENTATIONS

Papers published/ accepted in refereed journals

1. Aghababaei, R and **Joshi, SP** (2012) A crystal plasticity analysis of length-scale dependent internal stresses with image effects. *Accepted in Journal of the Mechanics and Physics of Solids*. doi:10.1016/j.jmps.2012.07.005.
2. Habibi, M, Gupta, M and **Joshi, SP** (2012) Size-effects in textural strengthening of hierarchical magnesium nano-composites. *Accepted in Materials Science and Engineering-A*. doi:10.1016/j.msea.2012.07.080.
3. Abhilash, AS, Purohit, PK and **Joshi, SP** (2012) Stochastic rate-dependent elasticity and failure of soft fibrous networks. *Soft Matter*; 8, 7004-7016.
4. Zhang, J and **Joshi, SP** (2012) Phenomenological crystal plasticity modeling and detailed micromechanical investigations of pure magnesium. *Journal of the Mechanics and Physics of Solids*, 60, 945-972.
5. Li, B, **Joshi, SP**, Almagri, O, Ma, Q, Ramesh, KT and Mukai, T (2012) Rate-dependent hardening due to twinning in an ultrafine-grained magnesium alloy. *Acta Materialia*, 60, 1818-1826.
6. Mirkhani, H and **Joshi, SP** (2011) Crystal plasticity of nanotwinned microstructures: a discrete twin approach for copper. *Acta Materialia*, 59, 5603-5617.
7. Aghababaei, R and **Joshi, SP** (2011) Grain size–inclusion size interaction in metal matrix composites using mechanism-based gradient crystal plasticity. *International Journal of Solids and Structures*, 48, 2585-2594.
8. Aghababaei, R, **Joshi, SP** and Reddy, JN (2011) Nonlocal continuum crystal plasticity with internal residual stresses. *Journal of the Mechanics and Physics of Solids*, 59, 713–731.
9. Abhilash, AS, **Joshi, SP**, Mukherjee, A and Mishnaevsky, L, Jr. (2011) Micromechanics of diffusion induced damage evolution in reinforced polymers. *Composites Science and Technology*, 71, 333-342.
10. Habibi, M.K., **Joshi, SP** and Gupta, M (2010) Hierarchical magnesium nano-composites for enhanced mechanical response, *Acta Materialia*, 58, 6104-6114.
11. Suh, YS, **Joshi, SP**, and Ramesh, KT (2009) An enhanced continuum model for size-dependent strengthening and failure of particle reinforced composites, *Acta Materialia*, 57, 5848-5861.
12. Li, B, **Joshi, SP**, Azevedo, K, Ma, E, Ramesh, KT, Figueiredo, RB, and Langdon, TG. (2009) Dynamic testing at high strain rates of an ultrafine-grained magnesium alloy processed by ECAP, *Materials Science and Engineering-A*, 517 (1-2), 24-29.
13. **Joshi, SP**, Eberl, C, Cao, B, Ramesh, KT, and Hemker, KJ. (2009) On the occurrence of Portevin-Le Chateliér instabilities in ultrafine-grained Al5083. *Experimental Mechanics*, 49, 207-218.
14. Cao, B, **Joshi, SP**, and Ramesh, KT. (2009) Strengthening mechanisms in cryomilled UFG Al 5083 at quasistatic and dynamic rates of loading. *Scripta Materialia*, 60, 619-622.
15. Zhang, H, Ye, J, **Joshi, SP**, Schoenung, JM, Chin, ESC, and Ramesh, KT. (2008) Rate-dependent behavior of hierarchical Al matrix composites. *Scripta Materialia*, 59, 1139-1142.
16. **Joshi, SP** and Ramesh, KT. (2008) Stability map for nanocrystalline and amorphous materials. *Physical Review Letters*, 101, 025501. Also selected for the Virtual Journal of Nanoscale Science & Technology, July 21, 2008.

17. **Joshi, SP** and Ramesh, KT. (2008) Grain size dependent shear instabilities in body-centered and face-centered-cubic materials. *Materials Science and Engineering-A*, 493, 65-70.
18. **Joshi, SP** and Ramesh, KT. (2008) Rotational diffusion and grain size dependent shear instability in nanostructured materials. *Acta Materialia*, 56, 282-291.
19. **Joshi, SP** and Ramesh, KT. (2007) An enriched continuum model for the design of a hierarchical composite. *Scripta Materialia*, 57, 877-880.
20. Zhang, H, Ye, J, **Joshi, SP**, Schoenung, JM, Chin, ESC, Gazonas, GA and Ramesh, KT. (2007) Super-lightweight nanoengineered aluminum for strength under impact. *Advanced Engineering Materials*, 9, 355-359.
21. Mukherjee, A, **Joshi, SP** and Saha Chaudhuri, A. (2007) Transducer shape optimization for instability control of smart piezolaminated columns. *Inverse Problems in Science and Engineering*, 15, 151-162.
22. **Joshi, SP**, Ramesh, KT, Han, BQ and Lavernia, EJ. (2006) Modeling the constitutive response of bimodal metals. *Metallurgical and Materials Transactions A*, 37, 2397-2404.
23. **Joshi, SP**, Mukherjee, A. and Schmauder, S. (2003) Numerical characterization of functionally graded active materials under electrical and thermal fields. *Smart Materials and Structures*, 12, 571-579.
24. **Joshi, SP**, Mukherjee, A. and Schmauder, S. (2003) Exact solutions for characterization of electro-elastically graded materials. *Computational Materials Science*, 28(3-4), 548-555.
25. Mukherjee, A. and **Joshi, SP** (2003) A gradientless technique for optimal distribution of piezoelectric material for structural control. *International Journal for Numerical Methods in Engineering*, 57, 1737-1753.
26. Mukherjee, A. and **Joshi, SP** (2002) Piezoelectric sensor and actuator spatial design for shape control of piezolaminated plates. *AIAA Journal*, 40, 1204-1210.
27. Mukherjee, A. and **Joshi, SP** (2002) Energy efficient actuators in vibration control of plated structures. *Journal of Sound and Vibration*, 258, 179-190.
28. Mukherjee, A., **Joshi, SP** and Ganguli, A. (2002) Active vibration control of piezolaminated stiffened plates. *Composite Structures*, 55, 435-443.
29. Mukherjee, A. and **Joshi, SP** (2001) Design of actuator profiles for minimum power consumption. *Smart Materials and Structures*, 10, 305-313.
30. **Joshi, SP**, Mukherjee, A., Kheur, M. and Mehta, A. (2001) Mechanical performance of endodontically treated teeth. *Finite Elements in Analysis and Design*, 37, 587-601.

Papers submitted/ in preparation

1. Aghababaei, R and **Joshi, SP** (2012) Micromechanics of crystallographic size-effects in metal matrix composites induced by thermo-mechanical loading. *Sub judice (International Journal of Plasticity)*.
2. Ho, SL, **Joshi, SP** and Tay, AAO (2012) Three dimensional modeling of delamination in encapsulated silicon devices. *Sub judice (IEEE Transactions on Components, Packaging and Manufacturing Technology)*.
3. Ho, SL, **Joshi, SP** and Tay, AAO (2012) Thermal-rate dependent delamination of metal-polymer interfaces: experiments and modeling. *Sub judice (Engineering Fracture Mechanics)*.
4. Hariharan, S, **Joshi, SP**, and Balaya, P (2012). Superior lithium storage performance in $-Fe_2O_3$ using conversion reaction. *To be submitted*.

Invited seminars at Universities

1. **Joshi, SP** (2011) *Continuum Crystal Plasticity with Nonlocal Internal Stresses*. Department of Mechanical Engineering and Engineering Science, University of North Carolina, Charlotte, 04/19/2011.
2. **Joshi, SP** (2010) *Viscoelasticity and Continuum Mechanics*. The Sixth GEM⁴ Summer School, National University of Singapore (<http://www.dbs.nus.edu.sg/mechano/events/gem4/>), 07/25/10.
3. **Joshi, SP** (2010) *Nonlocal Continuum Crystal Plasticity with Internal Residual Stresses*. Center for Advanced Metallic and Ceramic Systems, Johns Hopkins University, 06/25/10.
4. **Joshi, SP** (2010) *Computational Modeling of Length-scale Effects in Heterogeneous Materials*. Ecole Polytechnique Fédérale de Lausanne (EPFL), 05/07/10.
5. **Joshi, SP** (2010) *Geometric Softening Induced Shear Instability in Nanostructured Materials*. Institut für Materialprüfung, Werkstoffkunde und Festigkeitslehre (IMWF), Univ. of Stuttgart, 05/05/10.
6. **Joshi, SP** (2010) *Nonlocal Continuum Crystal Plasticity with Internal Residual Stresses*, Institut für Materialforschung II, Karlsruher Institut für Technologie (KIT), 05/04/10.
7. **Joshi, SP** (2007) *An Enriched Continuum Model for Shear Instabilities in Nanostructured Materials*. Department of Mechanical Engineering, IIT Bombay, India, 09/29/07.
8. **Joshi, SP**. (2007) *Mechanics of Nanostructured Materials*. Thapar University, India, 09/27/07.

Conference oral presentations (#indicates presenter)

1. **Joshi, SP[#]**, Abhilash, AS and Purohit, PK (2012) *Stochastic Failure Mechanics of Soft, Fibrous Networks*. Fourth International Conference on Structural Stability and Dynamics (January 4-6, 2012); Malaviya National Institute of Technology, Jaipur, Rajasthan, India. **(Keynote)**.
2. Mirkhani, H[#] and **Joshi, SP** (2011) *A Size-dependent Crystal Plasticity Model for Nanotwinned Copper*. Third International Symposium on Computational Mechanics (ISCM III) and the Second Symposium on Computational Structural Engineering (CSE II) (December 5-7, 2011); National Taiwan University, Taipei, Taiwan.
3. Zhang, J[#] and **Joshi, SP** (2011) *Bottom-up Crystal Plasticity Investigation of Magnesium Matrix Composites*. Third International Symposium on Computational Mechanics (ISCM III) and the Second Symposium on Computational Structural Engineering (December 5-7, 2011); National Taiwan University, Taipei, Taiwan.
4. Abhilash, AS[#], Purohit, PK and **Joshi, SP** (2011) *Modeling the Rate-Dependent Stochastic Response of Discrete Filament Networks*. Third International Symposium on Computational Mechanics (ISCM III) and the Second Symposium on Computational Structural Engineering (CSE II) (December 5-7, 2011); National Taiwan University, Taipei, Taiwan.
5. **Joshi, SP[#]** and Mirkhani, H (2011) *Crystal Plasticity of Nanotwinned Microstructures*. Session: Recent Advances in the Quasicontinuum Method and other Atomistic/Continuum Coupling Techniques, and Studies of Microstructural Defects in Materials. 11th US National Congress on Computational Mechanics (USNCCM 11, July 25-28, 2011), Minneapolis, MN, USA.
6. **Joshi, SP[#]** and Ramesh, KT (2010) *Grain Rotation Induced Evolution of Multiple Shear Bands in Nanostructured Materials*. Session: Size Scale Effects in Micro/Nano Structured Materials and Composites (Organizer: Prof. Rashid Abu Al-Rub), 2010 ASME International Mechanical Engineering Congress and Exposition. (Nov 12-18, 2010); Vancouver, British Columbia, Canada. **(Invited)**

7. Mirkhani, H[#] and **Joshi, SP** (2010) *Modeling the Strengthening-Softening Response of Nanotwinned Crystals*. Session: Size Scale Effects in Micro/Nano Structured Materials and Composites (Organizer: Prof. Rashid Abu Al-Rub), 2010 ASME International Mechanical Engineering Congress and Exposition. (Nov 12-18, 2010); Vancouver, British Columbia, Canada. **(Invited)**
8. Abhilash, AS[#] and **Joshi, SP** (2010) *Micromechanics of Diffusion Induced Damage Evolution in Reinforced Polymers*. 4th International Conference on Advanced Computational Engineering and Experimenting, ACE-X 2010 Paris, France, (July 08-09, 2010).
9. Aghababaei, R, **Joshi, SP**[#] and Zhang, J (2010) *Length-Scale Dependent Response of Hierarchical Composites using Enriched Polycrystal Plasticity*. 16th US National Congress on Theoretical and Applied Mechanics (June 27-July 2, 2010), Penn State University, Pennsylvania, USA.
10. Aghababaei, R[#] and **Joshi, SP** (2010) *A Nonlocal Continuum Theory Accounting for Size-Dependent Bauschinger Effect*. 16th US National Congress on Theoretical and Applied Mechanics, USNCTAM (June 27-July 2, 2010), Penn State University, Pennsylvania, USA.
11. **Joshi, SP**[#] and Ramesh, KT (2010) *Stability Map for Nanostructured and Amorphous Materials*. 16th US National Congress on Theoretical and Applied Mechanics (June 27-July 2, 2010), Penn State University, Pennsylvania, USA.
12. Suh, YS[#], Kim, YB, **Joshi, SP** and Ramesh, KT. (2010) *Size-dependent Ductile Failure Analysis of Particle-reinforced Composites via Finite Element Modeling of Dislocation Punched Zone*. TMS Annual Meeting and Exposition, (Feb 14-18, 2010), Seattle, Washington, USA.
13. **Joshi, SP**[#], Suh, YS and Ramesh, KT (2009) *Length-scale Dependent Failure in Hierarchical Composites*. Nanocomposite Materials Symposium, TMS Annual Meeting (Feb 15-19, 2009), Moscone West Convention Center, San Francisco, USA. **(Invited)**
14. **Joshi, SP**, Huskins, EH[#] and Ramesh, KT. (2007) *Rate-Dependent Mechanical Response of Hierarchical Composites: Experiments and Modeling*. Session: Dynamic Response of Materials (Organizer: Prof. P.H. Geubelle), 2007 ASME Congress. (Nov 10-16, 2007); Seattle, Washington, USA.
15. **Joshi, SP** and Ramesh, KT[#]. (2007) *A Mechanistic Model for Shear Bands in Nanostructured Materials*. Structural Materials Division Symposium: Mechanical Behavior of Nanostructured Materials, in Honor of Carl Koch, 2007 TMS Annual Meeting, (Feb 25–1 March 2007), Florida, USA. **(Invited)**
16. **Joshi, SP**[#] and Ramesh, KT. (2006) *A Mechanistic Model for Plastic Instabilities in Nanostructured Materials*. Session: Modeling and Experiments in Nanomechanics and Nanomaterials (Organizer: Dr. Y. Mikata), 2006 ASME Congress. (November 5-10, 2006); Chicago, USA.
17. Zhang, H, **Joshi, SP**[#], Ramesh, KT, Ye, J, Schoenung, J and Chin, ESC. (2006) *Remarkable Dynamic Mechanical Properties of a Tri-modal Al-5083/B₄C Composite*. Amiya Mukherjee Symposium, TMS Annual Meeting, (March 12-16, 2006); San Antonio, TX. USA.
18. **Joshi, SP**[#], Ramesh, KT, Han, BQ and Lavernia, EJ. (2006) *Modeling the Constitutive Response of Bimodal Metals*. W.W. Gerberich Symposium, TMS Annual Meeting, (March 12-16, 2006), San Antonio, TX, USA.
19. **Joshi, SP**, Mukherjee, A[#], Prakash, O and Schmauder, S. (2004) *Active Structural Control of Compositionally Graded Piezoelectric Plates*. Minisymposium on Thermo-Electro-Mechanical Materials and Systems, Sixth World Congress on Computational Mechanics (WCCM). (September 5-10, 2004), Beijing, China.
20. Dias, A[#], **Joshi, SP**, Jain, S., Acharya, S. and Earath, S. (2004) *Thermo-Visco-Elastic Mechanics of Polymeric Micro-replication Process*. XIV International Workshop on Computational Mechanics of Materials (IWCM14). (September 23-25, 2004), Goa, India.

PATENTS

1. Apparatus and Method for Producing Embossed Film (US 2008/000131 A1). *Assignee: General Electric Company*. Inventors: Jain, SS, Acharya, N, **Joshi, SP**, Dias, A, Vaish, N.
2. System and Method for Forming Textured Polymeric Films (US 2007/0001333 A1). *Assignee: General Electric Company*. Inventors: Dias, A, Harikumar, HK, Acharya, N, Jain, SS, Patil, MM, **Joshi, SP**, Tattersson, RL.
3. Digital X-Ray Detectors (US 2008/0078939 A1). *Assignee: General Electric Company*. Inventors: Hennessey, WH, Amm, B, Castleberry, D, Talya, SS, Gaikwad, VV, **Joshi, SP**, Vafi, H and Utschig, MJ.

FUNDED RESEARCH PROPOSALS

2011-2013: **Size-Dependent Mechanisms in Hierarchical Magnesium Composites (PI)**

Funding amount: USD 80,000

Funded by: US Army's International Technology Center – Pacific, Japan.

Collaborator: Professor Manoj Gupta (NUS)

2010-2013: **Discrete Twinning Dynamics (PI)**

Funding amount: SGD 360,990

Funded by: NSF-SERC Materials World Network (Scientific and Engineering Research Council (SERC) is the premier federal funding agency in Singapore) **US collaborator:** Professor KT Ramesh (JHU)

2010-2012: **Mesoscale Mechanics of Moisture Assisted Degradation in Reinforced Polymers (PI)**

Funding amount: SGD 106, 000

Funded by: Academic Research Fund (AcRF) Tier 1- Ministry of Education.

2009-2010: **Hierarchical Microstructures for High-Performance Light Weight Materials (PI)**

Funding amount: USD 50,000

Funded by: US Army's International Technology Center – Pacific, Japan.

Collaborator: Professor Manoj Gupta (NUS)

SUPERVISION OF UNDERGRADUATES, GRADUATE STUDENTS AND POST-DOCTORAL SCHOLARS

Doctoral students graduated:

Name	Thesis Title	Role	Duration	Defense Date
Ramin Aghababaei	Modeling Slip Gradients and Internal Stresses in Crystalline Microstructures with Distributed Defects	Main supervisor	June' 08- May' 12	May 04, 2012
Siow Ling Ho	Delamination in Microelectronics Packages: with Consideration of Three-dimensional and Rate Effects	Co-supervisor (with Dr. Andrew Tay)	2010-2011	May 29, 2012

Current doctoral graduate students:

Student	Topic	Role	Duration	Remarks
Balaji Selvarajou	Discrete Twinning Mechanics	Main supervisor	August'12-	
Srirama Hariharan	Nanostructured Electrode Materials for Lithium-ion Batteries	Co-supervisor	Jan'09-present	with Dr. Palani Balaya
Abhilash, A.S.	Discrete Micromechanics of Random Fibrous Microstructures	Main supervisor	June'08-present	
Hamidreza Mirkhani	Crystal Plasticity of Nanotwinned Microstructures	Main supervisor	June'08-present	

Current post-doctoral fellows:

Dr. Jing Zhang (since June 2009): Crystal plasticity of magnesium

Dr. Ramin Aghababaei (since Dec. 2011): Size-effects in crystalline materials

Undergraduate students:

(FYP:Final Year Project; UROP:Undergraduate Research Opportunity Program; SEP:Student Exchange Program)

Student	Topic	Designation	Year
Liang Zhang	Stochastic failure response of soft fibrous networks	FYP	2012-13
Siang Poh Chua	Mesoscale modeling and design of bioinspired materials for impact energy absorption	FYP	2012-13
Terence Li	Design strategies for nano-Si in Li-ion battery anodes	SEP U. of Toronto (CA)	May-July'12
Jeffery Yu	Modeling the mechanical behavior of three-dimensional fibrous networks	FYP	2010-11
Shihua Zhang	Microstructural modeling of nano-micro heterogeneous composites	FYP	2010-11
Sun Lin	Mechanics of nanostructured materials	UROP	2010-11
Chi Huan Nguyen	Finite element modeling of size-dependent elasticity in materials	UROP	2010-11
Meryl Song	Size-dependent crystal plasticity of heterogeneous materials	FYP	2009-10
Chun Yun Kee	Mechanics of energy storage	FYP	2009-10
Piyush Mehta	Modeling of nanocrystalline materials	UROP	2009-10
Aditi Gulati	Modeling of biological systems	SEP U. of Auckland (NZ)	Oct'09-Jan'10

TEACHING

▪ AY 08-09-present: National University of Singapore

- **ESP2106-Principles of Continua** (sophomore UG)
Student Feedback:3.7/5.0 (2008-09); 4.2/5.0 (2009-10);4.12/5.0 (2010-11)

- **ESP3206**-Continuum Mechanics (junior UG).
Student Feedback:3.9/5.0 (2008-09);4.4/5.0 (2009-10);4.4/5.0 (2010-11)
- **AY 2007-08: The Johns Hopkins University**
 - **ME530.602**- Mechanics of Solids (Spring'07, Graduate, with Prof. Sean Sun)
 - **ME530.215**- Mechanics Based Design (Spring'07, sophomore UG, with Prof. K.T. Ramesh)
 - **ME530.418**- Aerospace Structures and Materials (Fall' 07, senior UG)

PROFESSIONAL SERVICE

To the scientific community:

- *Editorial Board Member:*
 - Materials Science and Engineering: A (Elsevier)
 - Journal of Surfaces and Interfaces of Materials (American Scientific Publishers)
- *Reviewer:* Journal of the Mechanics and Physics of Solids; Mechanics of Materials; Computational Materials Science; Scripta Materialia; Mathematics and Mechanics of Advanced Structures; Composites Science and Technology; Materials Science and Engineering-A; International Journal of Impact Engineering; International Journal of Applied Mechanics; Materials Characterization; Metallurgical and Materials Transactions –A; Smart Materials and Structures; International Journal for Numerical Methods in Engineering; Journal of Sound and Vibration.
- Mini-symposium co-organizer at the 22nd International Workshop on Computational Mechanics of Materials (IWCMXXII) to be held in Baltimore, USA (September 24-26, 2012):
 - **Plasticity: Bridging the Scales from Micro to Macro**
(with Prof. Amit Acharya and Prof. Jaafar El-Awady)
- Mini-symposium co-organizer at the 8th World Congress on Computational Mechanics (WCCM8-ECCOMAS 2008) held in Venice, Italy (2008):
 - **Length Scale Effects in Dynamic Failure of Materials**
(with Prof. K.T. Ramesh and Prof. J.F. Molinari).
 - **Multiscale Mechanics of Interfaces**
(with Prof. A. Mukherjee, Prof. S. Schmauder and Dr. C. Eberl).
- Member, Society for Engineering Science (SES)
- Member, Society for Experimental Mechanics (SEM)

To the Department and University:

- Committee member: ME-Graduate studies committee, Engineering Science Program- Curriculum committee.
- Co-organizer and coordinator: Brown-Bag Seminar Series in Mechanical Engineering.
- Committee member: NUS-ME PhD theses defense, Graduate qualifying exams, UG-final year projects.
- Represented NUS as a judge at the Singapore International Mathematics Challenge 2010 (SIMC-2010).
- Member: Challenge Setting and Evaluation Committee for Singapore International Mathematics Challenge 2012 (SIMC-2012).