

Curriculum Vitae

Manish Shrikhande

Business Address:

Department of Earthquake Engineering
Indian Institute of Technology Roorkee
Roorkee-247667. INDIA
Phone: +91-1332-285437, Fax: +91-1332-276899/273560
E-mail: mshrifeq@iitr.ac.in

Home Address:

135/2, Vikas Nagar
Indian Institute of Technology Roorkee
Roorkee-247667. INDIA
Phone: +91-1332-285605
E-mail: m.shrikhande@gmail.com

Personal information

Date of Birth: November 16, 1969

Nationality: Indian

Sex: Male

Degrees

Ph.D. from Indian Institute of Technology, Kanpur, 1998.

M.E. (Earthquake Engineering) from University of Roorkee, Roorkee, 1992.

B.E. (Civil Engineering) from Devi Ahilya Vishwa Vidyalaya, Indore, 1990.

Honors

National Certificate of Merit in 1985.

University Medal for the best student in M.E. (Earthquake Engg.) in 1992.

All India Council for Technical Education Career Award for Young Teachers in 1999.

Indian National Academy of Engineering Young Engineer Award in 2002.

Grants

U.G.C. fellowship for graduate studies in 1990.

Research Grant of 0.1 Million INR from Department of Science and Technology, Government of India, for *Atlas of Indian Strong Motion Records* in 1999.

Research Grant of 0.1 Million INR from Department of Science and Technology, Government of India, for *Effect of Supplemental Viscous Dampers on Seismic Response of Asymmetric Plan Buildings* in 2000.

Research Grant of 10 Million INR from Department of Science and Technology, Government of India, for *Modernisation and Upgradation of Shake Table Facility* in 2001.

Research grant of 1.5 Million INR from Ministry of Human Resource Development for vibration control using supplemental damping devices in 2005.

Research grant of 1.5 Million INR from Ministry of Earth Science for wavelet packet based characterization of scenario earthquake ground motion in 2015.

Memberships

Member of Indian Society of Earthquake Technology since 1991.

Affiliate member of Earthquake Engineering Research Institute, California since 2003.

Experience

Professor in the Department of Earthquake Engineering, Indian Institute of Technology Roorkee since April 2014.

Associate Professor in the Department of Earthquake Engineering, Indian Institute of Technology Roorkee during 2009–2014.

Assistant Professor in the Department of Earthquake Engineering, Indian Institute of Technology Roorkee during 2001–2009.

Lecturer in the Department of Earthquake Engineering, University of Roorkee during 1998–2001.

Teaching assistant in the Department of Civil Engineering, Indian Institute of Technology Kanpur during 1992–1997.

Teaching assistant in the Department of Earthquake Engineering, University of Roorkee, Roorkee during 1990–1992.

Professional activities

Coordinator, Intellectual Property Rights Cell, Indian Institute of Technology Roorkee during 2016–ongoing.

Associate Dean Sponsored Research and Industrial Consultancy, Indian Institute of Technology Roorkee since 2015–ongoing.

Secretary, Indian Society of Earthquake Technology, Roorkee during 2011–2013.

Co-Editor, ISET Journal of Earthquake Technology, Roorkee during 2009–2011.

Convener, Earthquake Resistant Design (CED 39) Drafting Group of Dams and Retaining Structures, constituted by the Bureau of Indian Standards, New Delhi.

Member, Mechanical Vibration and Shock Sectional Committee (MED 28) constituted by the Bureau of Indian Standards, New Delhi.

Organised two courses (14-week durations) on Earthquake Engineering for teachers of engineering colleges and polytechnics.

Organised short term course (1-week) on Finite Element Method and Applications for Engineers from Indian Railways.

Organised two short term course (1-week) on FApplied Numerical Methods for teachers of engineering colleges.

Organised two one-month training programmes on *Seismic Retrofitting of School Buildings* for engineers from public works department. These courses were sponsored by the National Disaster Management Authority (NDMA).

Reviewed research articles for Journal of Structural Engineering, ASCE; ISET Journal of Earthquake Technology; Journal of Earthquake Engineering; The West Indian Journal of Engineering; Journal of the Geological Society of India; Soil Dynamics and Earthquake Engineering; Journal of Vibration and Control; Structural Engineering and Mechanics; Applied Soft Computing; Earthquakes and Structures; and Engineering Geology.

Advised on the adoption of site-specific seismic design parameters for major engineering projects.

Participated in the seismic safety audit of the plant and equipment of M/s Moser-Baer India Ltd., Noida, U.P.

Participated in seismic qualification of several critical control equipment of various power plant projects.

Design of Rail Track Rocket Sled system foundation for test speeds upto Mach 3.

Work in progress

System identification for damage detection using vibration records.

Reliability of finite element computations.

Reliability based formulation of earthquake resistant design code.

Publications

Books

Atlas of Indian Strong Motion Records (CD-ROM), Department of Earthquake Engineering, Indian Institute of Technology Roorkee, 2001.

Earthquake Resistant Design of Structures (*Co-authored with Dr. Pankaj Agarwal*), PHI Learning Pvt. Ltd., New Delhi, 2006. ISBN: 978-81-203-2892-1.

Finite Element Method and Computational Structural Dynamics, PHI Learning Pvt. Ltd., New Delhi, 2014. ISBN: 978-81-203-4995-7.

Chapters in Books

A. Kumar, S.K. Thakkar, A. Bhargava, R.N. Dubey, P. Agarwal, S. Basu, and M. Shrikhande. Records of instrumented buildings and study of structural response of staff quarters building of Regional Passport Office, Ahmedabad for Bhuj Earthquake of January 26, 2001. In H.K. Gupta and G.D. Gupta, editors, *Earthquake Studies in Peninsular India since 1993 (Memoir 54)*, pages 143–173. Geological Society of India, Bangalore, India, 2003.

Shrikhande, M. Das, J.D., Bansal, M.K., Kumar, A., Basu, S., and Chandra B. Strong motion characteristics of Uttarkashi earthquake of October 20, 1991 and its engineering significance. In O.P. Varma, editor, *Research Highlights in Earth System Science. Volume 2: Seismicity*, pages 337–342. Indian Geological Congress, Roorkee, India, 2001.

Gopikrishna, K. and Shrikhande, M. Wavelet basis finite element solution for transient problems. In N.K. Gupta and A.V. Manzhirov, editors, *Topical Problems in Solid Mechanics*, pages 222–234, Elite Publishing House Pvt. Ltd., New Delhi, 2008.

Papers in Refereed Journals

- Pankaj and Shrikhande, M. On the arc length method in strain softening problems, *Int. J. Structures*, **13**, 93–107, 1993.
- Shrikhande, M. and Gupta, V.K. On generating ensemble of design spectrum compatible accelerograms, *Euro. Earthq. Engg.*, **X**(3), 49–56, 1996.
- Shrikhande, M. and Gupta, V.K. A generalized approach for the seismic response of structural systems, *Euro. Earthq. Engg.*, **XI**(2), 3–12, 1997.
- Shrikhande, M. and Gupta, V.K. Synthesizing ensembles of spatially correlated accelerograms, *J. Engg. Mech.*, ASCE, **124**(11), 1185–1192, 1998.
- Shrikhande, M. and Gupta, V.K. Dynamic soil structure interaction effects on seismic response of suspension bridges, *Earthquake Engineering and Structural Dynamics*, **28**, 1383–1403, 1999.
- Shrikhande, M. and Gupta, V.K. On the characterisation of the phase spectrum for strong motion synthesis, *Journal of Earthquake Engineering*, **5**(4), 465–482, 2001.
- Datta, A.K., Shrikhande, M. and Paul, D.K. On the optimal location of sensors in multi-storeyed buildings, *Journal of Earthquake Engineering*, **6**(1), 17–30, 2002.
- Chandra, B., Thakkar, S.K., Basu, S., Kumar, A., Shrikhande, M., Das, J., Agarwal, P. and Bansal, M.K. Strong motion records. *Earthquake Spectra*, Supplement A to Volume 18:53–66, 2002.
- Shrikhande, M. and Basu, S. Strong motion v/s Weak motion: Implications for seismic microzonation, *Journal of Earthquake Engineering*, **8**(1), 159–173, 2004.
- Shrikhande, M. and Basu, S. A critique of the ICOLD method for selecting ground motions to design large dams, *Engineering Geology*, **80**, 37–42, 2005.
- Kokil, A.S. and Shrikhande, M. Optimal placement of supplemental dampers in a structural system, *International Journal of Seismology and Earthquake Engineering*, **9**(3, Fall):125–135, 2007.
- Nanda, R.P., Agarwal, P. and Shrikhande, M. Frictional base isolation by geotextiles for brick masonry buildings, *Geosynthetics International*, **17**(1):48–55, 2010.
- Pokharkar, P. and Shrikhande, M. Structural Health Monitoring via Stiffness Update, *ISET Journal of Earthquake Technology*, **47**(1):47–59, 2010.
- Gopikrishna, K. and Shrikhande, M. Wavelet basis finite element solution of structural dynamics problems. *Engineering Computations*, **28**(3):275–286, 2011.
- Nanda, R.P., Agarwal, P. and Shrikhande, M. Retrofitting of masonry buildings by base isolation, *International Journal on Transportation and Urban Development*, **1**(1):44–47, 2011.
- Shrikhande, M. Reconstruction of missing response data for identification of higher modes, *Earthquakes and Structures*, **2**(4):323–336, 2011.
- Shiradhonkar, S.R. and Shrikhande, M. Seismic damage detection in a building frame via finite element model updating, *Computers & Structures*, **89**(23–24):2425–2438, 2011.
- Nanda, R.P., Agarwal, P. and Shrikhande, M. Base Isolation System Suitable for Masonry Buildings, *Asian Journal of Civil Engineering (Building and Housing)*, **13**(2):195–202, 2012.
- Nanda, R.P., Agarwal, P. and Shrikhande, M. Base Isolation by Geosynthetic for Brick Masonry Buildings, *Journal of Vibration and Control*, **18**(6):903–910, 2012.

- Nanda, R.P., Shrikhande, M. and Agarwal, P. Effect of Ground Motion Characteristics on the Pure Friction Isolation System, *Earthquakes and Structures*, **3**(2):169–180, 2012.
- Nanda, R.P., Agarwal, P. and Shrikhande, M. Suitable Friction Sliding Materials for Base Isolation of Masonry Buildings, *Shock and Vibration*, **19**(6):1327–1339, 2012.
- Kataria, N.P., Shrikhande, M. and Das, J.D. Deterministic seismic hazard assessment for Andaman and Nicobar region. *Journal of Earthquake and Tsunami*, **7**(4):1350035, 2013.
- Nanda, R.P., Shrikhande, M. and Agarwal, P. Low cost base isolation system for seismic protection of rural buildings, *Practice Periodical on Structural Design and Construction (ASCE)*, **21**(1):04015001-1–04015001-8, 2016.
- Baby, A. and Shrikhande, M. Wavelet packet characterization of scenario earthquake ground motions, *Journal of Earthquake & Tsunami*, **11**(2):1750006-1–1750006-23, 2017.

Papers at Refereed Conferences

- Shrikhande, M. and Gupta, V.K. Evolutionary seismic response and peak factors, Presented at the *Structural Engineering Convention*, Feb. 12–14, 1997, SERC Madras, India.
- Shrikhande, M., Das, J.D., Bansal, M.K., Kumar, A., Basu, S. and Chandra, B. Analysis of strong motion records from Dharmasala Earthquake of April 26, 1986. In *Proceedings of the Eleventh Symposium on Earthquake Engineering, Dec. 17-19*, pages 281–285. Department of Earthquake Engineering, University of Roorkee, India, 1998.
- Shrikhande, M. and Gupta, V.K. A note on phase characteristics of earthquake strong motion. In *Proceedings of the Eleventh Symposium on Earthquake Engineering, Dec. 17-19*, pages 239–244. Department of Earthquake Engineering, University of Roorkee, India, 1998.
- Shrikhande, M., Rai, D.C., Narayan, J.P. and Das, J. The March 29, 1999 earthquake at Chamoli, India. In *Proceedings of the Twelfth World Conference on Earthquake Engineering, Auckland, New Zealand*, Paper No. 2838, Volume 5, 2000.
- Shrikhande, M., Basu, S., Kumar, A., Chandra, B. and Das, J.D.. Analysis of strong motion data of Chamoli Earthquake of March 29, 1999. In H.R. Wason and Vipul Prakash, editors, *Workshop on Recent Earthquakes of Chamoli and Bhuj, May 24–26, 2001, Roorkee*, pages 315–324. Indian Society of Earthquake Technology, Roorkee, 2001.
- Kumar, A., Thakkar, S.K., Bhargava, A., Dubey, R.N., Agarwal, P., Basu, S., and Shrikhande, M. Records of instrumented buildings and study of structural response of staff quarters building of Regional Passport Office, Ahmedabad for Bhuj Earthquake of January 26, 2001.
- Shrikhande, M., Das, J.D., Kumar, A., and Basu, S.. Strong motion records from N.W. Himalayan and N.E. Indian regions: A review. In D.K. Paul, A. Kumar, and M.L. Sharma, editors, *Proceedings of 12th Symposium on Earthquake Engineering, Dec. 16-18*, pages 135–142. Department of Earthquake Engineering, Indian Institute of Technology Roorkee, Roorkee–247667. India, Phoenix Publishing House Pvt. Ltd., New Delhi, 2002.
- Shrikhande, M., Rai, D.C., Kumar, A., and Basu, S. Upgradation of shake table facility. In D.K. Paul, A. Kumar, and M.L. Sharma, editors, *Proceedings of 12th Symposium on Earthquake Engineering, Dec. 16-18*, pages 241–253. Department of Earthquake Engineering, Indian Institute of Technology Roorkee, Roorkee–247667. India, Phoenix Publishing House Pvt. Ltd., New Delhi, 2002.
- Gopikrishna, K. and Shrikhande, M. Wavelet basis finite element method for solution of engineering problems. In *Proceedings of the 2nd International Congress on Computational Mechanics and Simulation (ICCMS-06)*, December 8–10, IIT Guwahati, India, Paper # b023, 2006.

- Prasad, P., Shrikhande, M. and Agarwal, P. Performance-based seismic design of steel building frameworks. In *Proceedings of the Structural Engineering Convention (SEC 2005)*, Dec. 14–16, CDROM 420. Indian Institute of Science Bangalore, 2005.
- Prasad, P., Shrikhande, M. and Agarwal, P. Performance-based seismic design overview. In *Proceedings of the Structural Engineering Convention (SEC 2005)*, Dec. 14–16, CDROM 421. Indian Institute of Science Bangalore, 2005.
- Prasad, P., Shrikhande, M. and Agarwal, P. Issues and challenges in performance-based seismic design of steel building frameworks. In *Proceedings of the International Conference on Earthquake Engineering*, Feb. 25–26, pages 110–123. School of Civil Engineering, SASTRA Deemed University Thanjavur, 2006.
- Prasad, P., Shrikhande, M. and Agarwal, P.. Performance-based seismic design of steel building framework using parametric study. In *STESSA 2006*, August 14–17, Yakohama, Japan, pages 79–84, 2006.
- Prasad, P., Shrikhande, M. and Agarwal, P. Performance-based seismic design using energy method. In *Earthquake Disaster: Technology and Management*, Feb. 11–12, pages III:18–21. M.N. National Institute of Technology Allahabad, 2006.
- Nanda, R.P., Agarwal, P. and Shrikhande, M. Earthquake hazard mitigation for rural dwellings by P-F base isolation. In *Proceedings of the 14th World Conference on Earthquake Engineering*, Beijing, P.R. China, October 13–17, 2008, Paper # 09-02-0017.
- Nanda, R.P., Agarwal, P. and Shrikhande, M. Seismic retrofit of rural school buildings. In *Proceedings of the International Conference on Disaster Management Mitigation*, December 16–18, 2009, PSNACET, Dindigul, Paper # 28.
- Nanda, R.P., Agarwal, P. and Shrikhande, M. Retrofit of masonry buildings by base isolation. In *Proceedings of the International Conference on Advances in Civil Engineering*, December 21–22, Trivendrum, Paper # 37, pages 37–41, 2010.
- Nanda, R.P., Shrikhande, M. and Agarwal, P. Friction base isolation system for seismic protection of rural dwellings. In *Proceedings of the Twelfth World Conference of Seismic Isolation, Energy Dissipation and Active Vibration Control of Structures*, September 21–24, 2011, Sochi, Russia, 2011.
- Shiradhonkar, S.R. and Shrikhande, M. Seismic damage detection via finite element model updating. In *Proceedings of the 15th World Conference on Earthquake Engineering*, September 24–28, Lisbon, Portugal, Paper # 5244, 2012.
- Sansare, P. and Shrikhande, M. An energy based approach for performance based seismic design. In *Proceedings of the International Conference on Earthquake Engineering*, May 29–31, Skopje, Mecedonia, Paper # 166, 2013.
- Reddy, G.P. and Shrikhande, M. Seismic performance evaluation of concrete gravity dams using damage plasticity model, in *Proceedings of 15th Symposium on Earthquake Engineering*, December 11–13, Department of Earthquake Engineering, Indian Institute of Technology Roorkee, Paper # 170, 2014.
- Kaloni, S. and Shrikhande, M. Blind source separation based system identification of earthquake excited structures, in *Proceedings of 8th ISSS National Conference on MEMS, Smart Materials, Structures and Systems*, September 28–30, 2016, Indian Institute of Technology Kanpur, 2016.

Reports

Shrikhande, M., Basu, S., Chandra, B., Kumar, A., Das, J.D. and Bansal, M.K. Strong motion data, in *A Report on Chamoli Earthquake of March 29, 1999*, Department of Earthquake Engineering, University of Roorkee, Roorkee-247667, India.

Dissertations and Theses

M.E. Dissertation: Indirect Displacement Control Methods in Nonlinear Computational Mechanics, Dept. of Earthquake Engg., University of Roorkee, March 1992.

Ph.D. Thesis: Stochastic Response of Suspension Bridges to Spatially Varying Earthquake Excitations, Dept. of Civil Engg., Indian Institute of Technology Kanpur, July 1997.

Editorial Work

DEIW Course Series on Earthquake Engineering: Earthquake Resistant Design of Structures (A distance education (correspondence) programme for practicing engineers).

Invited seminars

Synthesis of Spatially Correlated Accelerograms at Indian Institute of Technology Kharagpur on December 26, 1999.

Earthquake and its Effects on Buildings at School of Architecture, IPS Academy, Indore (M.P.), India on December 26, 2002.

Earthquakes and Strong Motion Characteristics at Guru Nanak Dev Engineering College, Ludhiana, India on December 24, 2004.

Dynamics of Structures at Guru Nanak Dev Engineering College, Ludhiana, India on December 27, 2004.

Effect of Industrial Vibrations on Structures at Guru Nanak Dev Engineering College, Ludhiana, India on December 27, 2004.

Introduction to Dynamics of Structures at National Programme for Capacity Building in Architects for Earthquake Safety, Centre for Continuing Education, I.I.T. Roorkee on February 7, 2005.

Krylov Subspace Methods for Iterative Solution of Linear Algebraic Equations at Q.I.P. Short Term Course on Computational Fluid Dynamics, Continuing Education Center, I.I.T. Roorkee, on July 2-3, 2009.

System Identification and Structural Health Monitoring, at Department of Civil Engineering, I.I.T. Kanpur, on January 21, 2010.

Finite Element Analysis and Random Vibrations, at M/s Eaton Technologies, Pune, during June 07-11, 2010.

Reliability Issues in Earthquake Resistant Design, at Department of Civil Engineering, Faculty of Engineering and Technology, Jamia Milia Islamia, New Delhi, on March 03, 2012.

Finite Element Analysis for Dynamic Problems, at Guru Nanak Dev Engineering College, Ludhiana, India on July 24, 2013.

Innovations in Earthquake Structural Design of Buildings and Construction (via video conference) at Centre for Innovations in Public Systems (CIPS), Hyderabad, on October 06, 2015.

Engineering for Earthquake Effects at Department of Civil Engineering, Aligarh Muslim University on November 07, 2015.

Courses taught**At Post-graduate Level**

Earthquake Resistant Design of Structures	Earthquake Resistant Design of Special Structures
Structural Response Control for Seismic Protection	Solid Mechanics
Theory of Vibration	Reliability based Design
Random Vibrations	Numerical Methods for Dynamic Systems
Finite Element Method	

At Under-graduate Level

Aseismic Architecture	Computer Systems & Programming
Introduction to Earthquake Engineering	

Research Interests

Earthquake Engg.: Strong Motion Studies, Dynamic Soil-Structure Interaction, Vibration Control, Probabilistic Methods, System Identification and Inverse Problems.

Computer Applications: Finite Element and Boundary Element Methods, Parallel and Distributed Computing.

Research Supervision**At Doctoral Level**

System Identification for use in Earthquake Damage Detection of R.C. Framed Buildings by Alope Kumar Datta (Ph.D. awarded in 2001).

Wavelet-basis Finite Element Method for Solving Transient Problems in Structural Dynamics by K. Gopikrishna (Ph.D. awarded in 2008).

Distributed Base Isolation Systems for Low Cost Houses by Radhikesh Prasad Nanda (Ph.D. awarded in 2008).

Performance Based Seismic Design of Steel Buildings via Optimality Criteria by Prahlad Prasad (Ph.D. awarded in 2012).

At Master's Level

Optimal placement of fluid viscous dampers for enhancing seismic performance of existing buildings by Ajeet Shankar Kokil (M.Tech. awarded in 2004).

Analytical Modeling of Magneto-Rheological Dampers for Vibration Control by Ran Vijay Singh (M.Tech. awarded in 2005).

Ground motion confidence levels implied by importance factors in IS-1893:2002 by Karadkhelkar Vaibhav Vinodrao (M.Tech. awarded in 2007).

On the reliability of a class of system identification techniques by Koustuv Choudhary (M.Tech. awarded in 2007).

- Uncertainty quantification in finite element analysis* by Bhagwat Sagar Baburao (M.Tech. awarded in 2008).
- Case studies in deterministic seismic hazard assessment* by Kataria Nitin Parasmal (M.Tech. awarded in 2008).
- Time-domain system identification for structural health monitoring of buildings* by Pokharkar Prashant Vasantrao (M.Tech. awarded in 2008).
- Structural health monitoring via flexibility update* by Patil Abhijeet Daji (M.Tech. awarded in 2009).
- Structural health monitoring via finite element model updating*, by Shiradhonkar Saurabh Ramesh (M.Tech. awarded in 2009).
- Stochastic extension of the Burridge-Knopoff model for earthquake* by Koushik Roy (M.Tech. awarded in 2010).
- Soil-structure interaction using scaled boundary finite element method* by Saikat Sarkar (M.Tech. awarded in 2010).
- Reliability basis for earthquake resistant design* by B. Shivakumar (M.Tech. awarded in 2011).
- Uncertainty quantification in computational structural dynamics* by Bipasa Roy (M.Tech. awarded in 2011).
- Finite element model updating* by Dora Nitin Mahesh (M.Tech. awarded in 2012).
- Use of energy balance criterion for earthquake resistant design* by Kulkarni Amrit Anil (M.Tech. awarded in 2012).
- Estimation of seismic energy demand for use in earthquake resistant design* by Sansare Prasad Ganesh (M.Tech. awarded in 2013).
- Demand spectra for energy basis design* by Avisek Mukherjee (M.Tech. awarded in 2013).
- Wavelet basis characterization of earthquake ground motions* by Ajin Baby (M.Tech. awarded in 2014).
- Seismic behaviour of tunnel form construction* by Kumar Vikas (M.Tech. awarded in 2014).
- Optimal sampling points in triangular and tetrahedral elements for stress recovery* by Adarsh S. (M.Tech. awarded in 2015).
- Blind source separation in structural dynamics* by Souvik Roy (M.Tech. awarded in 2016).
- Controlled demolition of structures* by Nihir Khungur Boro (M.Tech. awarded in 2016).