Jack P. Moehle, PhD, PE

TY and Margaret Lin Professor of Engineering Department of Civil & Environmental Engineering University of California, Berkeley 775 Davis Hall, Berkeley, CA 94720-1710 510-407-6124; moehle@berkeley.edu

Degrees

BSCE (1977), MSCE (1978), Ph.D. (1980) Department of Civil Engineering/College of Engineering University of Illinois at Urbana-Champaign

Research/Work Areas

Structural engineering analysis and design methods, with emphasis on reinforced concrete construction and resistance to earthquakes, including tall buildings, transportation systems, and existing hazardous construction.

Work History

TY and Margaret Lin Professor of Engineering, University of California, Berkeley, 2011-present Professor, University of California, Berkeley, 1990-present Associate Professor, University of California, Berkeley, 1986-90 Assistant Professor, University of California, Berkeley, 1980-86 Director, Pacific Earthquake Engineering Research Center, University of California, Berkeley, 1997- 2008 Director, Earthquake Engineering Research Center, University of California, Berkeley, 1991- 2001 Vice-Chair for Technical Services, Civil Engineering, University of California, Berkeley, 1990-91, 2012 Research Assistant, University of Illinois, Urbana-Champaign, 1977-80 Baxter and Woodman, Inc., Crystal Lake, Illinois, 1976

Consulting services, various times: American Society of Civil Engineers; Applied Technology Council; Bayez/Patel; Buscovitch Engineers; Concrete Reinforcing Steel Institute; Dames and Moore; DeSimone Consulting Engineers; Electric Power Research Institute; Kennedy/Jenks/Chilton; Portland Cement Association; Putnam Collins Scott Associates; Rutherford & Chekene; Simpson, Gumpertz, & Heger; Skidmore, Owings, & Merrill; U.S. Army Corps of Engineers; URS/Blume; Washoe Medical; Westinghouse Hanford; Wiss Janney Elstner; Works Consultancy (New Zealand).

Expert witness services, various times: Allen-Matkins; Rudloff Wood & Barrows; The State Bar of California; Wilson Smith Cochran Dickerson.

Peer review services, various times: Bay Area Rapid Transit District; Bay Conservation and Development Commission; California Department of Transportation; City of San Diego; City and County of San Francisco; City of Los Angeles; City of Seattle; San Francisco Public Utilities Commission; Stanford University; Transbay Terminal Joint Powers Authority.

Honors and Awards

Helmut Krawinkler Award, SEAONC, 2014.

National Academy of Engineering, 2014 election year.

Award in Excellence, under the category Innovations, for the Tall Buildings Initiative, by WSSPC, 2013. Top 25 Newsmakers, Engineering News Record, 2012.

Best Technical Presentation of the Convention, Structural Engineers Association of California, for

"Seismic Design of Cast-in-Place Concrete Diaphragms, Chords, and Collectors," 2011.



Honors and Awards (continued)

Award of Excellence (SEAONC), and Excellence Award (SEAOC) for Tall Buildings Initiative Guidelines on Performance-Based Seismic Design of Tall Buildings, 2011 Outstanding Paper Award, Earthquake Spectra, 2009 College of Fellows, SEAOC, 2008 Award of Excellence (SEAONC), and Excellence Award (SEAOC) for SEAONC Recommended Administrative Bulletin on Seismic Design Review of Tall Buildings Using Non-Prescriptive Procedures, 2008. President's Award, Los Angeles Tall Buildings Structural Design Council, 2008. Arthur J. Boase Award, Concrete Research Council, ACI, 2008. Chester Paul Siess Award for Excellence in Structural Research, ACI, 2007. Best Journal Paper of the Year, for "Seismic Analysis, Design, and Review of Tall Buildings," The Structural Design of Tall and Special Buildings Journal, 2006. Honorary Member, Structural Engineers Association of Northern California, 2006 Distinguished Alumnus Award, Civil Engineering, University of Illinois, Urbana-Champaign, 2005 The Annual Distinguished Lecture Award, Earthquake Engineering Research Institute, 2005 Fellowship, Japan Society for the Promotion of Science, April-May 2002. Delmar E. Bloem Distinguished Service Award, ACI, March 2001 Outstanding 1998 Journal Paper, for "Evolution of Seismic Building Design Practice in Japan," Los Angeles Tall Buildings Structural Design Council, May 1999 Extraordinary Achievement in Seismic Rehabilitation of Buildings, Applied Technology Council, July 1998 ERICO Award from ERICO, Inc. (Concrete Reinforcement Products), March 1998 Alfred E. Lindau Award, ACI/Concrete Reinforcing Steel Institute, March 1998 EERI Special Recognition for Northridge Earthquake Reconnaissance Report, Volume 1, 1997 Roy W. Carlson Distinguished Professor of Civil Engineering, 1993-1998 Fellow of the American Concrete Institute (ACI), 1990 CE Alumni Association Young Civil Engineers Achievement Award, University of Illinois, 1990 Huber Research Prize, ASCE, 1990 Chi Epsilon Excellence in Teaching Award, Pacific District, 1986 Regents Junior Faculty Fellowship, University of California, 1981 Chester P. Siess Award: University of Illinois, 1980 University Fellowship: University of Illinois, 1978 University Honors: The Bronze Tablet, University of Illinois, 1978

Affiliations

Member, US National Academy of Engineering (2014 election year) Registered Civil Engineer, State of California (Since 1983) Fellow, American Concrete Institute (Since 1990) Member, American Society of Civil Engineers Member, Earthquake Engineering Research Institute (since 1981) Member, Structural Engineers Association of California, (since 1983)

Guidelines/Code Development

 Building Code Requirements for Structural Concrete (ACI 318), Member, 1989-present; Chair of Sub H -Seismic Effects, 1995-2014; Chair of Main Committee, 2015-present
Guidelines for Performance-Based Seismic Design of Tall Buildings, Tall Buildings Initiative, PEER, 2010.
Guidelines and Commentary for Seismic Rehabilitation of Buildings (ATC-33/FEMA 273), Senior Technical

Guidelines/Code Development (continued)

Committee and Co-Leader of the Concrete Team, 1993-98
State of California Proposition 122 Seismic Retrofit Practices Improvement Program (ATC-40), 1994-96
Improved Seismic Design Guidelines for California Highway Bridges (ATC 32), 1992-95
Guidelines for Evaluation and Repair of Masonry and Concrete Walls (ATC 43/FEMA 306-308), 1996-98.
Prestandard on Seismic Rehabilitation of Buildings (FEMA 356), 1998-2000
Seismic Evaluation Guidelines for Existing Buildings (FEMA 178), Update for FEMA, Project Oversight
Panel, 1996-98
Various projects to develop professional guidance:
Development of Next-Generation Performance-Based Seismic Design Procedures for New and
Existing Buildings (ATC 58), Project Management Committee, for FEMA, 2001-2012.
Seismic Design of Reinforced Concrete Special Moment Frames, NIST Technical Brief No. 1, Project
Director, 2008-2009.
Seismic Design of Cast-in-Place Concrete Diaphragms, Chords, and Collectors (ATC 76-7), NIST
Technical Brief No. 3, Project Director, 2009-2010.
Seismic Design of Cast-in-Place Concrete Special Structural Walls and Coupling Beams (ATC 88),
NIST Technical Brief No. 6, Project Director, 2010-2011.
Evaluation and Improvement of Inelastic Seismic Analysis Procedures (ATC 55), for FEMA, 2001-
2004.
Integration of Collapse risk Mitigation Standards and Guidelines for Older Reinforced Concrete
Buildings into National Standards (ATC 76-5), Project Technical Committee, 2009-2010.
Improved Nonlinear Static Seismic Analysis Procedures – Multiple-Degree-of-Freedom Modeling
(ATC 76-6), Project Review Panel, 2009-2010.
Identification and Mitigation of Nonductile Concrete Buildings (ATC 78), Project Management
Committee, 2011-present.
Improved Procedures for Selecting and Scaling Earthquake Ground Motions for Performing Time-
History Analyses (ATC 82), Project Review Panel, 2009-2011.
Improved Structural Response Modification Factors for Seismic Design of New Buildings - Phase I
(ATC 84), Project Review Panel, 2009-2011.
Analysis of Seismic Performance of Reinforced Concrete Buildings in the 2010 Chile Earthquake,
Including Effects of Non-Seismic-Force-Resisting Building Structural Elements (ATC 94), Project
Management Committee, 2011-2013.
Development of Updated NEHRP Post-Earthquake Investigations Strategy: Phase I (ATC 101),
Project Management Committee, 2013-2014.
Development of Performance-Based Seismic Design: An Action Plan for Future Studies, FEIVIA,
Project Director, 1993-95
Other Service to Profession
American Concrete Institute
Board of Direction. 2010-2013
ACI Technical Activities Committee. 1995-2001
ACI Committee 368. Detail and Proportion of Earthquake Resisting Structural Elements and
Systems; Member 1988-98; Chairman 1988-1994
ACI-ASCE Committee 442, Response of Concrete Buildings to Lateral Forces, 1982-98
ACI-ASCE Committee 352, Joints and Connections in Monolithic Concrete Structures. 1984-present
ACI Committee 408, Bond and Development of Reinforcement, 1988-92
ACI Committee 200 Colomic Dehebilitation of Eviation Duildings 1002 and east

ACI Committee 369, Seismic Rehabilitation of Existing Buildings, 1992-present

Other Service to Profession (continued) ACI Task Group on Shear in Slabs, 1984 Task Group on Disaster Reconnaissance, Chair 2012-2013 Federation Internationale du Beton (fib) Task Group 7.1 Assessment and retrofit of existing structures, 1999-2003 Task Group T 7.2 Displacement-based design and assessment, 1999-2003 Task Group T 7.4, Seismic design and assessment procedures for bridges, 2003-2006 Task Group T 7.5, Seismic design of buildings incorporating high performance materials, 2003-2011 Task Group T 7.6, Critical comparison of major seismic design codes for buildings, 2003-2011 Task Group T 7.7, Probabilistic performance-based seismic design, 2009-2011 American Society of Civil Engineers Publications Secretary, Committee on Seismic Effects, 1988-93 Minimum Design Loads for Buildings and Other Structures, ASCE/SEI 7, 2012-2013 Earthquake Engineering Research Institute Editor, EERI Earthquake Spectra, 1993-96 Guest Editor, Special Issue on Chile 2010 Earthquake, 2010-2012 Board of Directors, 2008-2011 Vice President, 2009-2011 Nominations Committee, Member 2010, 2012, Chair 2011 Publications Committee, Chair 2010-2011 Learning From Earthquakes Committee, Chair 2011-2013 Structural Engineers Association of California Board of Directors of SEAONC, 1992-94 Seismology Committee of SEAONC, various years Reinforced Concrete Committee of SEAONC, various years Research Committee of SEAONC, Chair 1988-89 SEAONC AB-083 Task Group, Recommended Administrative Bulletin on the Seismic Design & Review of Tall Buildings Using Non-Prescriptive Procedures, 2006-2007 Advisory Committee on Earthquake Hazards Reduction (ACEHR), National Earthquake Hazards Reduction Program (NEHRP), 2010-present Charles Pankow Foundation, Advisory Committee, 2011-present. Building Seismic Safety Council (BSSC) NEHRP Provisions Update Committee, 1998-2004 BSSC/PUC Issue Study on Spine Systems with Articulated Hinges, 2010-present San Francisco Bay Conservation and Development Commission, Engineering Criteria Review Board, 2012-present. Seismic Gas Shutoff Standards Committee, Office of the State Architect, State of California, 1981-83 California Universities for Research in Earthquake Engineering (CUREe), Board of Directors, 1991-93 NCEER/MCEER Scientific Advisory Committee, 1991-1999 CONCERT (Cooperating Organizations for Northern California Earthquake Research and Technology), Board of Directors, 1993 External Advisory Committee, Southern California Earthquake Center, 1998-2009 Highway Seismic Research Council, FHWA/MCEER Highways Project, 1993-2006 ATC 76 NEHRP Consultants Joint Venture Program Committee 2007-present. Asia-Pacific Network of Centers for Earthquake Research (ANCER), Board of Directors, 2001-2008. Reviewer of technical papers submitted for publication in Journal of Structural Engineering of ASCE;

Other Service to Profession (continued)

Journal of Engineering Mechanics of ASCE; Journal of the American Concrete Institute; Journal of Earthquake Engineering and Structural Dynamics; Earthquake Spectra **Reviewer of proposals to National Science Foundation** Technical Program Committee for Third U.S. National Conference on Earthquake Engineering, 1986, and Fifth U.S. National Conference on Earthquake Engineering, 1994 Eighth World Conference on Earthquake Engineering, Student Volunteer Coordinator, 1984 Session Chairman at numerous professional meetings Workshop on Repair and Retrofit of Existing Buildings, Organizing Group for NSF, meetings in Japan and Los Angeles, 1987-89 Repair and Retrofit of Existing Buildings, Executive Committee, NSF, 1988-89 Technical Advisor, Double Deck Peer Review Panel, Caltrans, 1990-1993 Organizing Committee for ATC-15-4, San Diego, 1992, and Vancouver, 1994 First National Bridge Seismic Research Conference, Steering Committee, FHWA, 1994-95 U.S.-Japan Seminar on Urban Earthquakes, Chair of U.S. side, Tsukuba Science City, Japan, 1995 Organizer of NSF-sponsored Kobe Earthquake Reconnaissance, 1995 Second National Bridge Seismic Research Conference, Steering Committee, FHWA, 1996-97 Structural Engineers Association of California Annual Convention, Technical Program Co-Chair, 1996 UCBerkeley Seismic Review Committee 2001-present Editorial Board, The Earthquake Engineering and Engineering Vibration (EEEV) Journal, 2002-present. US-Side Organizer, US-Japan Workshops on Performance-Based Design Methodology for Reinforce Concrete Buildings, 1998, 1999, 2000, 2001, 2002, 2003. US-Side Organizer, US-Japan NEES-Edefense Workshop on Collapse Simulation of Reinforced Concrete Buildings, 2005. 2006 Earthquake Conference, Chair, Program Committee (EERI, SSA, OES), 2004-2006. Improving Seismic Performance of Existing Buildings and Other Structures, San Francisco, (SEI, ATC), Program Committees, 2008-2009, 2014-2015. Before the Disaster Task Force, San Francisco Planning and Urban Research Association, 2007-2012. Concrete Coalition, Earthquake Engineering Research Institute, 2007-present San Francisco Public Utilities Commission, Seismic Task Force, 2009-present. Bay Area Rapid Transit, Structural Peer Review, Chair, 2001-present. Identification of Missing Elements in Current Plans for the Development and Implementation of Performance-Based Seismic Design, National Institute of Building Sciences, Project Management Committee, 2008-2009. Development of NIST Measurement Science R&D Roadmap: Earthquake Risk Reduction in Buildings, National Institute of Building Sciences, Project Management Committee, 2012-2013. Publications – Over 350, including: 1. Seismic Design of Reinforced Concrete Buildings, Jack Moehle, McGraw-Hill, New York, NY, 760 pp, 2014. 2. "Rotation-Based Shear Failure Model for Lightly Confined Reinforced Concrete Columns," W Ghannoum, J Moehle, Journal of Structural Engineering, ASCE, 2012. 3. "Performance assessment of tall concrete core-wall building designed using two alternative approaches," T Yang, J Moehle, Y Bozorgnia, F Zareian, J Wallace, Earthquake Engineering & Structural Dynamics, 2012. "Seismic Design of Cast-in-Place Concrete Special Structural Walls and Coupling Beams: A Guide 4. for Practicing Engineers," J.P. Moehle, T. Ghodsi, J.D. Hooper, D.C. Fields, R. Gedhada, NEHRP

Other Service to Profession (continued)

Seismic Design Technical Brief No. 6, National Institute of Standards and Technology, Gaithersburg, MD, NIST GCR 10-917-4, 2011.

- 5. "Seismic Design of Cast-in-Place Concrete Diaphragms, Chords, and Collectors: A Guide for Practicing Engineers," J.P. Moehle, J.D. Hooper, D.J. Kelly, T.R. Meyer, *NEHRP Seismic Design Technical Brief No. 3*, National Institute of Standards and Technology, Gaithersburg, MD, NIST GCR 10-917-4, 2010.
- 6. "Seismic Performance Evaluation of Facilities: Methodology and Implementation," T Yang, J Moehle, B Stojadinovic, A Der Kiureghian, *Journal of Structural Engineering*, ASCE, 2009.
- 7. "Dynamic Shear and Axial Load Failure of Reinforced Concrete Columns," K. J. Elwood and J. P. Moehle, *Journal of Structural Engineering*, ASCE, V. 134, No. 7, July 2008, pp. 1189-1198.
- "Seismic Design of Reinforced Concrete Special Moment Frames: A Guide for Practicing Engineers," J. P. Moehle, J. D. Hooper, and C. D. Lubke, *NEHRP Seismic Design Technical Brief No.* 1, National Institute of Standards and Technology, Gaithersburg, MD, NIST GCR 8-917-1, 2008.
- 9. "Update to ASCE/SEI 41 Concrete Provisions, KJ Elwood, AB Matamoros, JW Wallace, DE Lehman, JA Heintz, AD Mitchell, MA Moore, MT Valley, LN Lowes, CD Comartin, and JP Moehle, *Earthquake Spectra*, EERI, V 23, N 3, August 2007, pp. 493–523
- 10. "Shear Strength Model for Lightly Reinforced Concrete Columns," H. Sezen and J. P. Moehle, Journal of Structural Engineering, ASCE, Vol. 130, No. 11, pp. 1692-1703, November 2004.
- 11. "Models for Laterally Loaded Slab-Column Frames," by Shyh-Jiann Hwang and Jack Moehle, ACI Structural Journal, Vol. 97, No. 2, pp. 345-352, March-April 2000.
- 12. "Evolution of Seismic Building Design Practice in Japan," by A. S. Whittaker, J. P. Moehle, and M. Higashino, *Structural Design of Tall Buildings*, Vol. 7, 1998, pp 93-111.
- 13. "Ductility and Detailing Requirements of Bearing Wall Buildings," by J. Wallace and J. P. Moehle, Journal of Structural Engineering, ASCE, Vol. 118, No. 6, June 1992, pp 1625-1644.
- 14. "Displacement-Based Design of RC Structures Subjected to Earthquakes," by J. P. Moehle, *Earthquake Spectra*, EERI, Vol. 8, No. 3, August 1992, pp 403-428.
- 15. "Effect of Floor Slab on Behavior of Slab Beam Column Connections," by C. W. French and J. P. Moehle, *ACI SP 123, Design of Beam-Column Joints for Seismic Resistance*, 1991, pp 225-258.
- 16. "Lateral Displacement Ductility of Reinforced Concrete Flat Plates," by A. Pan and J. P. Moehle, *ACI Structural Journal*, Vol. 86, No. 3, May June 1989, pp 250 258.
- 17. "Strength of Slab Column Edge Connections," by J. P. Moehle, *ACI Structural Journal*, Vol. 85, No. 1, January 1988, pp 89-98.

Technical Presentations - Over 350

Courses Taught

- CE 120 Structural Engineering
- CE 123 Reinforced Concrete Design
- CE 123L Structural Concrete Design Project
- CE 128A Structural Systems I
- CE 140 Fundamentals of Structural Design and Applications to Reinforced Concrete
- CE 143 Reinforced Concrete Design
- CE 199 Supervised Independent Study
- CE 220 Theory of Structures
- CE 244 Reinforced Concrete Structures
- CE 244A Advanced Reinforced Concrete I

Courses Taught (continued)

- CE 244B Advanced Reinforced Concrete II
- CE 298 Structural Engineering Design Research Seminar
- CE 299 Individual Research

Doctoral Students Graduated

- 1. Stavroula Pantazopoulou, "Three Dimensional Aspects of the Behavior of R/C Structures Subjected to Earthquakes," 1987.
- 2. Bahram Shahrooz, "Experimental Study of Seismic Response of R/C Setback Buildings," 1987.
- 3. Austin Pan, "Reinforced Concrete Flat Plates Under Lateral Loading: An Experimental Study Including Biaxial Effects," 1988.
- 4. John Wallace, "The 1985 Chile Earthquake: A Study of Requirements for Bearing Wall Buildings," 1989.
- 5. Shyh-Jian Hwang, "An Experimental Study of Flat-Plate Structures under Vertical and Lateral Loads," 1989.
- 6. Xioxuan Qi, "Displacement Design Approach for Reinforced Concrete Structures Subjected to Earthquakes," 1989.
- 7. José Martínez-Cruzado, "Experimental Study of Post-Tensioned Flat Plate Exterior Slab-Column Connections Subjected to Gravity and Biaxial Loading," 1993.
- 8. Allah-Nawaz Qaisrani, "Interior Post-Tensioned Flat-Plate Connections Subjected to Vertical and Biaxial Lateral Loading," 1993.
- 9. Mark A. Aschheim, "Design and Evaluation of Reinforced Concrete Bridges for Seismic Resistance," 1995.
- 10. Silvia Mazzoni, "Design and Response of Lower-Level Beam-Column Joints in Ductile Reinforced-Concrete Double-Deck Bridge Frames," 1997.
- 11. Dawn E. Lehman, "Seismic Performance of Well-Confined Concrete Bridge Columns," 1998.
- 12. Laura N. Lowes, "Finite Element Modeling of Reinforced Concrete Beam-Column Bridge Connections," 1999.
- 13. Clay Naito, "Experimental and Computational Evaluation of Reinforced Concrete Bridge Beam-Column Connections for Seismic Performance," 2000.
- 14. Abraham C. Lynn, "Seismic Evaluation of Existing, Reinforced Concrete Building Columns," 2001.
- 15. Halil Sezen, "Seismic Behavior and Modeling of Reinforced Concrete Building Columns," 2002.
- 16. Kenneth Elwood, "Shake Table Tests and Analytical Studies on the Gravity Load Collapse of Reinforced Concrete Frames," 2002.
- 17. Tsung Yuan (Tony) Yang, "Performance evaluation of innovative steel braced frames," 2006 (cosupervised with Bozidar Stojadinovic).
- 18. Jennie Anne Watson-Lamprey, Selection and scaling of ground motion time series, 2007 (cosupervised with Norm Abrahamson).
- 19. Wassim Michael Ghannoum, Experimental and Analytical Dynamic Collapse Study of a Reinforced Concrete Frame with Light Transverse Reinforcement, 2007.
- 20. Yoon Bong Shin, Shaking Table Tests of Reinforced Concrete Columns, 2007.
- 21. Gabriel Hurtado, Effect of Torsion on Flexural Ductility of Reinforced Concrete Bridge Columns, 2009.
- 22. Wael Hassan, Analytical and Experimental Assessment of Seismic Vulnerability of Beam-Column Joints without Transverse Reinforcement in Concrete Buildings, 2011.
- 23. Panagiotis Galanis, A Probabilistic Method to Identify Seismically Hazardous Older-Type

Doctoral Students Graduated (continued)

Concrete Frame Buildings, 2014.

- 24. Tea Visnjic, Design Considerations for Earthquake-Resistant Reinforced Concrete Special Moment Frames, 2014 (co-supervised with Marios Panagiotou).
- 25. Ahmet Can Tanyeri, Seismic Performance and Modeling of Reinforced Concrete and Post-Tensioned Precast Concrete Shear Walls, 2014.