



HALLIWELL

MEHRAN RAHMANI, Ph.D., P.E.

SENIOR FORENSIC ENGINEER, CIVIL/STRUCTURAL
ENGINEERING SERVICES

LOS ANGELES/SAN DIEGO, CA

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SPECIALTIES

- Forensic Fire Investigations
- Construction Defect Analysis
- Water Intrusion Investigation
- Expert Witness and Litigation Support
- Earthquake Damage Investigations
- Foundation Settlement and Geotechnical Investigation
- Finite Element and Advanced Structural Analysis
- Crane Collapse
- Roof Collapse/Damage
- Instrumentation and Vibration Monitoring
- Non-Destructive Testing

BIOGRAPHY

Dr. Mehran Rahmani is a licensed Civil Engineer who specializes in forensic engineering investigations. He is classically educated in both civil and structural engineering and holds a Ph.D. in Structural and Earthquake Engineering. He is an expert in earthquake and seismic assessments, vibration monitoring, advanced structural analysis, damage investigation and scope of repair recommendations. His specialties include fire damage; crane collapse; analysis of residential and commercial buildings subjected to excessive foundation settlement and earthquake motions employing Finite Element Analysis techniques; water intrusion and recommended repairs; roof collapse investigations, and non-destructive testing.

Dr. Rahmani performs complex collapse/failure analyses of structures and determines the root cause of incidents using advanced simulations including linear, nonlinear, and dynamic response analysis. He has extensive experience in writing technical reports, including investigation and repair recommendation reports, technical papers, and research reports. He provides litigation support, including reviewing facts and opinions, assessing code compliance, conducting laboratory or non-destructive testing of structural components, interpreting test results, and delivering expert testimony.

QUALIFICATIONS

Ph.D. in Structural and Earthquake Engineering, University of Southern California (USC), Los Angeles, CA

M.S. in Electrical Engineering, University of Southern California (USC), Los Angeles, CA

M.S. in Structural Engineering, Sharif University of Technology, Tehran, Iran

B.S. in Civil Engineering, University of Mazandaran, Iran

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INDUSTRY CERTIFICATIONS, LICENSES, MEMBERSHIPS AND HONORS

- Licensed Professional Civil Engineer (PE), State of California, since 2016
- Licensed Disaster Service Worker, California Safety Assessment Program (SAP), 2016
- 2022 Outstanding ASCE Faculty Advisor Award, American Society of Civil Engineers (ASCE) Los Angeles Section, California, 2022
- 2021 Outstanding ASCE Faculty Advisor Award, American Society of Civil Engineers (ASCE) Orange County Branch, California, 2021

PROFESSIONAL EXPERIENCE

- Halliwell, Senior Forensic Engineer, Civil/Structural Engineering Services
- California State University Long Beach, Department of Civil Engineering & Construction Engineering Management, Associate Professor
- Thornton Tomasetti, Inc., Project Engineer
- Weidlinger Associates, Inc., Senior Engineer
- University of Southern California (USC), Graduate Research and Teaching Assistant

REPRESENTATIVE ASSIGNMENTS

Forensic and Field Investigation

Reinforced Concrete Building Fire Investigation | Los Angeles, CA

Determined the extent of fire damage to the structural walls and framing of a 4-story reinforced concrete apartment building and determined scope of repair and the applicable code upgrades.

Apartment Building Fire Investigation | Mt Prospect, IL

Determined the extent of fire damage to the structural walls and framing of a 35-unit 3-story apartment building and determined scope of repair and the applicable code upgrades for the apartment building.

Apartment Building Fire Investigation | Boise, ID

Determined the extent of fire damage to the structural walls and framing of a 12-unit 3-story wood-framed apartment building in Boise, Idaho, and determined scope of repair and the applicable code upgrades for the building.

Water Treatment Plant Fire Investigation | San Diego, CA

Determined the extent of fire damage to two reinforced concrete pump station tanks and determined scope of repair to the structures.

Earthquake Damage Investigation | Christchurch, New Zealand

Conducted earthquake damage assessments for several types of buildings including mid-rise and low-rise buildings such as reinforced concrete office buildings, tilt-up panel warehouses and steel frame commercial and residential buildings and developed scope of repair to the structures.

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Crane Collapse Cause Investigation | New York, NY

Investigated the origin and cause of a construction crawler crane collapses, including modeling, analysis, and visualization of progressive collapse.

Roof Collapse Damage Investigation | Los Angeles, CA

Inspected roof collapses/damage in a commercial warehouse structure due to loss of support columns hit by forklift and developed scope of repair to the structures.

Building Envelope Inspections – Hurricane/Tornado Related Damage | New Jersey, NJ & Fort Lauderdale, FL

Inspected various mid-rise and high-rise apartment buildings for water and wind damage to the building envelope, in New Jersey (affected by Superstorm Sandy) and in Florida (affected by recent tornadoes).

Rebar Corrosion and Reinforced Concrete Damage Investigation | Marina del Rey, CA

Determined the extent of damage to a parking structures affected by rebar corrosion and concrete spalling, including in-situ strength testing of concrete and developing repair recommendations.

Instrumentation and Vibration Monitoring

Floor Vibration Measurement and Analysis | San Francisco, CA

Measured and analyzed floor vibration (i.e. acceleration and tilt) at three levels in a high-rise commercial office building in San Francisco, California. Determined the cause and proposed retrofit design to mitigate significant floor vibrations.

Ambient Vibration Test of a High-Rise Building | New Jersey, NJ

Performed Ambient vibration testing on an 18-story residential building impacted by hurricane Sandy to understand building's dynamic response to strong wind and vibration.

Structural Analysis and Design

Peer-Review of Design of SoFi Stadium Roof Structure | Los Angeles, CA

On behalf of the City of Inglewood, I served as the lead peer-reviewer for the design of the iconic roof structure of the SoFi (i.e., Rams) stadium in Los Angeles. The design review included Finite Element Analysis and cross-checking, review of deep foundation design and geotechnical reports, review of post-tensioned columns, roof steel structure and cable net, and triple-pendulum seismic isolator.

Analysis and Design Peer-Review of USTA Tennis Stadium's Roof Truss | New York, NY

Analyzed and peer-reviewed design of a complex retractable space truss roof structure built to cover the USTA's tennis stadium.

SELECT MEDIA INTERVIEWS

- Scott Key Bridge Collapse in Baltimore – Interview on Fox11 LA (March 26, 2024).
- I-10 Freeway Fire Damage (near Alameda Street) in Los Angeles – Interview on Fox11 LA (November 11, 2023)

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- Northridge Earthquake 30th Anniversary – Interview with KNX News Radio on Jan 17, 2024.

SELECT PUBLICATIONS AND REPORTS

- **M Rahmani**, A Barjani, MI Todorovska. “Variability in parameter estimation for a tall steel frame building”. *J. of Earthquake Spectra*, 39(4), 2071-2099. DOI: 10.1177/87552930231195370 (2023).
- MI Todorovska, H Ali, **M Rahmani**. “Functionally graded beams as surrogate structural models: shear beam with exponentially graded rigidity”. *ASCE Journal of Engineering Mechanics*, 149(6), 04023027. DOI: 10.1061/JENMDT.EMENG-6962, (2023).
- **M Rahmani**, JR Grabinski, MI Todorovska, M Ebrahimian. “Damage detection and localization in a full-scale slice of a 7-story shear wall building tested on the UCSD-NEES shake table”, *ASCE Journal of Structural Engineering*, 149(1), 04022223. DOI: 10.1061/JSENDH/STENG-11440 (2022).
- **Rahmani M**, Todorovska MI. “Structural health monitoring of a 32-storey steel-frame building using 50 years of seismic monitoring data”. *Earthquake Engineering and Structural Dynamics*. 50(6) 1777-1800. DOI: 10.1002/eqe.3422 (2021).
- MI Todorovska, EA Girmay, F Wang, **M Rahmani**. “Wave propagation in a doubly tapered shear beam: Model and application to a pyramid-shaped skyscraper”, *Journal of Earthquake Engineering and Structural Dynamics*, 51(4), p 764-792. DOI: 10.1002/eqe.3590, (2021).
- **Rahmani M**, Dehaghani M E, Todorovska M. I. “Time-wave velocity analysis for early earthquake damage detection in buildings: application to a damaged full-scale RC building, *Earthquake Engineering and Structural Dynamics*, 44(4) 619-636, DOI: 10.1002/eqe.2539 (2015).
- Ebrahimian M, **Rahmani M**, Todorovska M. I. “Nonparametric identification of wave dispersion in high-rise buildings by seismic interferometry”, *Earthquake Engineering and Structural Dynamics*, DOI: 10.1002/eqe.2453 (2014).
- **Rahmani M**, Ebrahimian M, Todorovska M. I. “Wave dispersion in high-rise buildings due to soil-structure interaction”, *Earthquake Engineering and Structural Dynamics*, DOI: 10.1002/eqe.2454 (2014).
- **Rahmani M.**, Todorovska M. I. “Structural health monitoring of a 54-story steel frame building - wave and vibrational characteristics during five earthquakes”, *Journal of Earthquake Spectra*, DOI: 10.1193/112912EQS339M (2013).
- M. Ly, D. Flores, P. Asvapathanagul, N. Banuelos, A. Calabrese, **M. Rahmani**, “Application of Immobilized Bacteria on Food Waste Biochar as Sustainable Solutions for Concrete”. Presented in *ASM Microbe 2022* conference, Washington, D.C., June 2022.
- CC Simsir, Gary Hart, **Mehran Rahmani**, “Using reliability to incorporate monotonic test data for a code compliance of long masonry wall design criteria”, *The 16th World Conf. on Earthqu. Eng. (16WCEE)*, Santiago, Chile, January 2017.

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- **M Rahmani**, T-Y Hao, MI Todorovska, R Boroschek “Structural health monitoring of Torre Central building by the wave method”, *The 16th World Conf. on Earthqu. Eng.* (16WCEE), Santiago, Chile, January 2017.
- B Arya, A Jain, CC Simsir, **M Rahmani**, DG Reyes, “Structural damage allocation from sequential earthquakes”, ASCE Forensic Engineering Conference, November 2015, Miami, Florida, p439-448, November 2015.
- H. Jahankhah, M. Ali Ghannad, **M. Rahmani**, “Alternative solution for kinematic interaction problem of soil–structure systems with embedded foundation”, *Journal of Tall and Special buildings*, **22**(3) 251-266, DOI: 10.1002/tal.685 (2010).
- M. Ali Ghannad, **M. Rahmani**, H. Jahankhah, “The frequency and damping of soil-structure systems with embedded foundation”, *AIP Conf. Proc.* 1020, 634, Italy, 2008.
- H. Jahankhah, M. Ali Ghannad, **M. Rahmani**, “On the FEMA440 regulations for Soil-Structure Interaction” *The 14th World Conf. on Earthqu. Eng.* (14WCEE), China, Sep. 2008.

Research Reports (funded by research grants)

- **Mehran Rahmani**, Xintong Ji, Sovann Kiet, “Damage detection and damage localization in bridges with low- density instrumentations using the wave-method: Application to a shake-table tested bridge”, 2022 / DOI: 10.31979/mti.2022.2033.
- **Mehran Rahmani**, Vesna Terzic, Andrea Calabrese, “A Practical Framework for Component-Level Structural Health Monitoring of the Gerald Desmond Bridge”, 2023 / DOI: 10.31979/mti.2023.2155.
- **Mehran Rahmani** and Manan Naik, “Structural Identification and Damage Detection in Bridges Using Wave Method and Uniform Shear Beam Models: A Feasibility Study”, 2021 / DOI: 10.31979/mti.2021.1934.