

Exponent®
Engineering & Scientific Consulting

Amory Martin, Ph.D., P.E.

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Professional Profile

Dr. Martin specializes in investigating structural failures, design and construction issues, disaster risk management, and earthquake engineering. Dr. Martin has led investigations and provided expert analysis on projects involving structural collapses, building façade issues, seismic performance of highway bridges, construction defects of high-rise buildings, adjacent construction issues, retaining wall failures, design-build and EPC infrastructure disputes. His work spans high-rise residential and commercial towers, bridges, marine and harbor structures, industrial facilities, and utility structures. Dr. Martin has experience in multi-hazard risk analysis for utility companies, including the development of fragility functions and optimization algorithms to prioritize infrastructure retrofits and manage climate-related risks.

Dr. Martin holds a Ph.D. in structural engineering, during which he invented structural topology optimization algorithms for high-rise buildings under seismic excitation with nonlinear dampers. Dr. Martin developed seismic capacity design methods for steel rocking braced frames and validated them through nonlinear response history analysis. His expertise includes dynamic analysis of structural systems subject to extreme loads – earthquakes, hurricanes, tornadoes, floods, snow, etc. – performance evaluation of steel and concrete structures, structural optimization, design of innovative seismic protective systems, and data-driven techniques related to risk analysis.

Dr. Martin is an adjunct professor at New York University, where he teaches a graduate course on structural dynamics. Prior to joining Exponent, Dr. Martin worked as a consultant for the World Bank on the socio-economic impacts of COVID-19.

Academic Credentials & Professional Honors

Ph.D., Civil and Environmental Engineering, Stanford University, 2020

M.S., Civil and Environmental Engineering, Stanford University, 2016

B.S., Civil Engineering, Johns Hopkins University, 2014

B.S., Mathematics, Johns Hopkins University, 2014

Achievement Rewards for College Scientists Fellowship, 2018

National Science Foundation Graduate Research Fellowship, 2015-2018

Stanford School of Engineering Fellowship, 2014

Johns Hopkins Civil Engineering Award, 2014

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Tau Beta Pi Engineering Honor Society, 2014

Licenses and Certifications

Professional Engineer Civil, California, #94465

Professional Engineer Civil and Structural, Massachusetts, #60651

Professional Engineer, New Jersey, #24GE05999800

Professional Engineer, New York, #108748

Professional Engineer Civil and Structural, Pennsylvania, #PE099163

Academic Appointments

Adjunct Professor, New York University, Tandon School of Engineering, 2023 - present

Prior Experience

Consultant, World Bank, Disaster Risk Management Economics, 2020

Engineer Intern, Thornton Tomasetti, New York, 2015

Professional Affiliations

American Society of Civil Engineers (ASCE), member

Earthquake Engineering Research Institute (EERI), member

Structural Engineers Association of New York (SEAoNY), member

Structural Engineering Institute (SEI), Optimal Structural Design committee member

Languages

French (France)

Patents

US Patent 9,132, 016: Implantable Shoulder Prostheses, September 2015 (Flaherty J.C., Fenton P.V., Martin A.)

Publications

Martin A, Jampole E, Hunt J. "Numerical Modeling of Damaged Bridges in Türkiye following the Kahramanmaraş Earthquake Events." 18th World Conference on Earthquake Engineering (18WCEE), Milan, Italy, 2024.

Jampole E, Martin A, Morgan T. "Impact of Design Errors in an Isolated Bridge: Does the Bridge Still Meet Seismic Performance Objectives?" Third European Conference on Earthquake Engineering and

Seismology (3ECEES), Bucharest, Romania, 2022.

Ceferino L, Martin A, Bambarén C. “Hospital System Response to Earthquakes in the COVID-19 Pandemic.” 12th National Conference on Earthquake Engineering (12NCEE), Salt Lake City, UT, 2022.

Martin A, Deierlein GG. “Generalized Modified Modal Superposition Procedure for Seismic Design of Rocking and Pivoting Steel Spine Systems.” Journal of Constructional Steel Research, (183): 106745, 2021.

Roth J, Martin A, Miller C, Jain RK. “SynCity: Using Open Data to create a Synthetic City of Hourly Building Energy Estimates by Integrating Data-Driven and Physics-Based Methods.” Applied Energy, (280): 115981, 2020.

Martin A, Markhvida M, Hallegatte S, Walsh B. "Socio-Economic Impacts of COVID-19 on Household Consumption and Poverty", Economics of Disasters and Climate Change: 1-27, 2020.

Martin A, Deierlein GG. “Structural Optimization of Stacked Rocking Spine Systems for Nonlinear Earthquake Response", 17th World Conference on Earthquake Engineering, Sendai, Japan, 2020.

Martin A, Deierlein GG. "Structural Topology Optimization of Tall Buildings for Dynamic Seismic Excitation Using Modal Decomposition", Engineering Structures, (216): 110717, 2020.

Martin A., Deierlein GG. “Capacity Design and Topology Optimization of Rocking Spine Systems for Nonlinear Earthquake Response”, PhD Dissertation, Stanford University, 2020.

Martin A, Deierlein GG, Ma X. "Capacity Design Procedure for Rocking Braced Frames using Modified Modal Superposition", Journal of Structural Engineering, (145)-6: 04019041, 2019.

Martin A, Deierlein GG. "Topology Optimization of Elastic Spines in Rocking Braced Frames", 11th U.S. National Conference on Earthquake Engineering, Los Angeles, CA, 2018.

Simpson B, Van Den Einde L, Anagnos T, Sen A, Martin A, Saiyed Z, Yin HZ. “Teaching School Safety and Advocacy in the Classroom." 11th U.S. National Conference on Earthquake Engineering, Los Angeles, CA, 2018.

Reports

Alami M, Gunay S, Mosalam K, Vargas L, Hassan W, Merino-Peña Y, Burton H, Alhawamdeh B, Lahna T, Xu S, Marinkovic M, Archbold J, Iturburu L, Martin A, BEKTAS N, Ceferino L, Duran B, Nobahar M, Romão X, Wang C, Zhou G, Zaoui A, Zaoui H, Kijewski-Correa T (2023). "StEER: Oukaïmedene Morocco Preliminary Virtual Reconnaissance Report (PVRR)." PRJ-4142, 2023.

Dilsiz A, Gunay S, Mosalam K, Miranda E, Arteta C, Sezen H, Fischer E, Hakhamaneshi M, Hassan W, ALhawamdeh B, Andrus S, Archbold J, Arslanturkoglu S, BEKTAS N, Ceferino L, Cohen J, Duran B, Erazo K, Faraone G, Feinstein T, Gautam R, Gupta A, Haj Ismail S, Jana A, Javadinasab Hormozabad S, Kasalanati A, Kenawy M, Khalil Z, Liou I, Marinkovic M, Martin A, Merino-Peña Y, Mivehchi M, Moya L, Pájaro Miranda C, quintero N, Rivera J, Romão X, Lopez Ruiz M, Sorosh S, Vargas L, Velani P, Wibowo H, Xu S, YILMAZ T, Alam M, Holtzer G, Kijewski-Correa T, Robertson I, Roueche D, Safiey A (2023). "StEER: 2023 Mw 7.8 Kahramanmaras, Türkiye Earthquake Sequence Preliminary Virtual Reconnaissance Report (PVRR)." PRJ-3824, 2023.

Kijewski-Correa T, Alhawamdeh B, Arteta C, Djima W, Do T, Mejía SG, Gunay S, Hassan W, Hormozabad SJ, Marinković M, Martin A, Merino-Peña Y, Pajaro C, Romão X, Burlotos C, Mosalam KM, Robertson I, “StEER: M7.2 Nippes, Haiti Earthquake Preliminary Virtual Reconnaissance Report (PVRR)”, PRJ-3269, 2021.

Martin A, Near-Collapse Performance of Existing RC Building Frames through Small-Scale Hybrid Testing Experimental Setup, NEES REU Final Report, University of Illinois at Urbana-Champaign, 2013.

Presentations

Nagananda T, Martin A, Ki D. “The State of Computational Design in 2025,” Structural Engineering Association of New York (SEAoNY), New York, NY, Oct 29, 2025.

Martin A, Steele T. “Predicting Force Demands in Stacked Rocking Spine Systems using the Modified Modal Superposition Method,” Engineering Mechanics Institute (EMI) Conference, Anaheim, CA, May 29, 2025.

Martin A, Preetam B. “Topology Optimization Today: Breakthrough Research and Inspiring Applications,” Structural Engineering Association of New York (SEAoNY) Annual Conference, New York, NY, Feb 13, 2025.

Martin A. “Forensic Engineering and Collapse Investigations,” CEE812 Structural Engineering Graduate Seminar, University of Michigan, Ann-Arbor, MI, Jan 21, 2025.

Martin A. “Forensic Engineering Consulting and Collapse Investigations”, Virginia Polytechnic Institute and State University, CEE 5944 Structural Engineering and Mechanics (SEM) Seminar, Blacksburg, VA, Sep 13, 2024.

Martin A, Jampole E, Hunt J. "Numerical Modeling of Damaged Bridges in Türkiye following the Kahramanmaraş Earthquake Events." 18th World Conference on Earthquake Engineering (18WCEE), Milan, Italy, Jul 2, 2024.

Martin A, “Structural Optimization 1: Introduction & Theory”; “Structural Optimization 2: Applications & Topology Optimization”, “Structural Optimization 3: Algorithms”, CEE 280: Advanced Structural Analysis, Stanford University, Prof. Deierlein, Guest Lectures, 2018 – 2023:

- Stanford University, Stanford, CA, Nov 29, Dec 1, 2023,
- Stanford University, Stanford, CA, Nov 16, 18, 2022,
- Stanford University, Stanford, CA, Nov 17, 19, 29, 2021,
- Stanford University, Stanford, CA, Nov 11, 13, 29, 2020,
- Stanford University, Stanford, CA, Nov 20, 2019,
- Stanford University, Stanford, CA, Nov 14, 16, 2018.

Martin A, “Dynamic Topology Optimization”, 1.583: Topology Optimization of Structures, MIT, Prof. Carstensen, Guest Lectures, 2022 – 2023:

- Massachusetts Institute of Technology (MIT), Cambridge, MA, Nov 15, 2023,
- Massachusetts Institute of Technology (MIT), Cambridge, MA, Nov 8, 2022.

Martin A, “Seismic Topology Optimization of High-Rise Buildings using Modal Decomposition and the Adjoint Method”, World Conference on Structural and Multidisciplinary Optimization (WCSMO15), Cork, Ireland, Jun 5, 2023.

Martin A, “Structural Optimization”, CE-UY-3133: Structural Analysis, New York University, Prof. Ceferino, Guest Lecture, Dec 12, 2022.

Martin A, Jampole E, Morgan T. "Impact of Design Errors in an Isolated Bridge: Does the Bridge Still Meet Seismic Performance Objectives?” Third European Conference on Earthquake Engineering and Seismology (3ECEES), Bucharest, Romania, Sep 8, 2022.

Martin A, Deierlein GG. “Seismic Topology Optimization of Tall Buildings Using Modal Decomposition”, Engineering Mechanics Institute (EMI) Conference, Jun 1, 2022.

Martin A, Deierlein GG. “Structural Optimization of Stacked Rocking Spine Systems for Nonlinear Earthquake Response”, 17th World Conference on Earthquake Engineering (17WCEE), Sendai, Japan, Sep 30, 2021.

Martin A, “Structural Optimization”, CE-UY-3133: Structural Analysis, New York University, Prof. Ceferino, Guest Lecture, May 4, 2021.

Martin A, Deierlein GG, “Seismic Design of Rocking and Pivoting Steel Spine Systems”, Earthquake Engineering Research Institute 2021 Annual Meeting, Mar 23-25, 2021.

Martin A, Deierlein GG. “Structural Topology Optimization for Dynamic Seismic Excitation”, Pacific Earthquake Engineering Research Annual Meeting, Poster Session, Berkeley, CA, Jan 2020.

Martin A, Deierlein GG. “Dynamic Topology Optimization for Seismic Excitation”, Skidmore Owings and Merrill, Company Research Presentation Online, Jul 2019.

Martin A, Deierlein GG. “Topology Optimization of Rocking Braced Frames for Nonlinear Earthquake Response”, Engineering Mechanics Institute (EMI) Conference, MS12 - Topology Optimization: From Algorithmic Development to Applications Part 1, Pasadena, CA, Jun 20, 2019.

Martin A, Deierlein GG. CEE 83: Seismic Design Workshop, Stanford University, Co-Instructor of undergraduate class, Sep-Dec 2018.

Martin A, Deierlein GG. "Topology Optimization of Elastic Spines in Rocking Braced Frames", 11th U.S. National Conference on Earthquake Engineering, Los Angeles, CA, Jun 27, 2018.

Martin A, Deierlein GG. “Topology Optimization of Self-Centering Rocking Systems subjected to Earthquake Loading”, ARUP, San Francisco Office, Sep 2017.

Martin A, Deierlein GG. “Topology Optimization of Rocking Braced Frames”, Topology Optimization Summer Course Presentations, Denmark Technological University (DTU), Lyngby, Denmark, Jun 2017.

Martin A, Deierlein GG. “Integrated Capacity Design Optimization of Rocking Braced Frames”, Minisymposium 95 - Recent Advances in Uplifting Structures and Rocking Isolation, Engineering Mechanics Institute (EMI), San Diego, Jun 2017.

Martin A, Chang CM. “Near-Collapse Performance of Existing RC Building through Small-Scale Hybrid Testing”, Quake Summit Poster Session, NEES Annual Meeting, Reno NV, Aug 2013.

Project Experience

International Arbitration

- Seismic Design of Concrete Bridges: Evaluated the seismic design and code compliance of a series of concrete bridges as part of a highway network through structural analysis with soil-structure interaction of concrete piles. Assisted the appointed expert in the joint expert conferral process.
- Seismic Isolation of Multi-Span Concrete Bridges: Examined the performance of a series of seismically isolated multi-span concrete bridges through both linear and nonlinear analyses. Advised counsel on key structural engineering issues and review of opposing expert reports.

Multi-Hazard Risk Analysis

- Utility Structural Assets: Formulated time-dependent fragility functions for structural assets considering multiple hazards, degradation of the assets, and climate change for a large utility company.
- Utility Financial Optimization: Developed an optimization algorithm to select critical electrical segments as part of a retrofit program, integrating cost-benefit ratios and wildfire ignition risk statistical analysis..

Design and Construction Disputes

- Mid-Rise Concrete Building: Project manager for an evaluation of the seismic design of the superstructure and foundations of a mid-rise building with concrete shear walls.
- High-Rise Residential: Analyzed vertical slab offsets in a high-rise concrete building through survey data analysis, structural analysis of the gravity system of key floors, and examination of construction procedures including shoring, reshoring, and concrete strength gain.
- High-Rise Residential: Determined the likely cause of the out-of-plumbness of a high-rise concrete building through review of survey data and building tolerance specifications. Co-wrote an expert report on our findings.

Structural Failures

- High-Rise Hotel Collapse: Investigated the collapse of a high-rise steel hotel building during construction through structural analysis of the gravity system of several key floors. Inspected evidence at the collapse site, selected key pieces for further examination, and developed a testing protocol.
- Bridge Collapse: Conducted site visits and documented observed conditions shortly after the collapse of a large-span steel bridge.
- Garage Collapse: Managed daily site visits at the collapse site of a steel and concrete garage. Documented evidence during emergency demolition and coordinated with local authorities and other involved parties for tagging, evidence gathering, and experimental testing (on-site and off-site). Co-authored an expert report on the cause of the partial collapse.
- Garage Demolition Collapse: Inspected site conditions and evidence after the collapse of a reinforced concrete garage during demolition. Coordinated with other parties for evidence gathering and testing.

Peer Reviews

Journal of Structural Engineering

Engineering Structures

Journal of Earthquake Engineering

Journal of Structural and Multidisciplinary Optimization (SMO)