

Brian M. McDonald, Ph.D., S.E.
Principal Engineer and Practice Director

Professional Profile

Dr. Brian McDonald is a Principal Engineer and the Director of Exponent's Buildings and Structures practice, which investigates and remedies performance problems ranging from leaking building envelopes to structural collapse. Dr. McDonald specializes in structural analysis and design, material behavior, and construction technology with focus on issues surrounding structural damage assessment and repair methods. During more than 20 years at Exponent, he has led evaluations of damaged wood frame, reinforced concrete, post-tensioned concrete and steel buildings as well as bridges, tunnels, industrial structures, power transmission lines, communication towers, cable-supported and fabric structures. Dr. McDonald has investigated structures damaged by wind, snow, explosion, fire, construction problems, design defects, decay and corrosion, as well as hundreds of structures damaged by the Loma Prieta, Northridge, San Simeon and Hawaii earthquakes. In addition to damage investigations, Dr. McDonald also provides peer review services for structural design of complex structures, including safety-critical nuclear power plant structures. Dr. McDonald's work often includes nonlinear and dynamic structural analysis; instrumentation and full-scale testing of structures; seismic risk assessment and retrofit; and material failures including fracture and plasticity analyses.

Dr. McDonald has held several positions in the fields of structural engineering and software design, most recently as Chief Analyst at Krawinkler, Luth, and Associates, a leading structural design firm. Dr. McDonald teaches a graduate level course in Finite Element Analysis at Stanford University.

Academic Credentials and Professional Honors

Ph.D., Civil Engineering, University of Wisconsin, Madison, 1988
M.S., Engineering Mechanics, University of Wisconsin, Madison, 1989
M.S., Civil Engineering, University of Wisconsin, Madison, 1984
B.S., Civil Engineering, University of Wisconsin, Madison (*with distinction*), 1982

Awarded 1996 Grand Prize Award from the American Concrete Institute for restoration of a concrete façade of a Philadelphia high-rise; serves on University of Wisconsin Alumni Advisory Board

Licenses and Registrations

Registered Professional Civil Engineer, California, #C47585; Registered Structural Engineer, California, #S4330; Registered Civil and Structural Engineer, New Mexico, #19925; Washington, #37689; Registered Structural Engineer, Illinois, #081-006025; Registered Professional Civil Engineer, Wisconsin, #35893-006; Registered Professional Civil Engineer,

New York, #081314; Registered Professional Civil Engineer, Hawaii, #12310-S; Registered Professional Civil Engineer Oklahoma, #22510; Registered Professional Engineer, Colorado, #41875; Registered Professional Civil Engineer, Alabama, #29048-E; Registered Professional Engineer, Maryland, #33587; Missouri, #PE-2008014092; Registered Structural Engineer, Oregon, #81321; Registered Civil Engineer, Maine, #11734; Registered Structural Engineer, Nevada, #021563

Publications

McDonald B, Ross B, Carnahan RA. The Bellevue crane disaster. *Engineering Failure Analysis*, 2011, in press.

McCann DJ, Corr D, McDonald B. Lessons learned from Marcy Bridge collapse. ASCE 5th Congress on Forensic Engineering, Washington DC, November 11–14 2009.

McDonald B. The art and science of designing structures to resist earthquakes. *Silicon Valley Engineering Council Journal* 2009; 1.

Gupta A, McDonald BM. Performance of building structures during the October 15, 2006 Hawaii earthquake. The 14th World Conference on Earthquake Engineering, Beijing, China, October 12–17, 2008.

Luth G, Supriya S, Krawinkler H, McDonald B. USC School of Cinema: An example of reparable performance based design. *Proceedings, 77th Annual Structural Engineers Association of California (SEAOC) Convention, Hawaii, 2008.*

Osteraas J, Gupta, A, Griffith, M, McDonald, B. Woodframe seismic response analysis—Benchmarking with buildings damaged during the Northridge Earthquake. *Proceedings, 2008 ASCE Structures Conference, Vancouver BC Canada, April 24–26, 2008.*

Ross B, McDonald BM, Saraf V. Big blue goes down. The Miller Park crane accident. *Engin Failure Anal* 2007; 14(6):942–961.

McDonald BM, Gupta A, Alavi B, Osteraas J. Rational seismic evaluation and retrofit of a multistory RC shear wall structure. 100th Anniversary Earthquake Conference Commemorating the 1906 San Francisco Earthquake, San Francisco, CA, April 18–22, 2006.

Gupta A, McDonald BM, Griffith M, Osteraas J. Displacement coefficients for conventional residential wood-frame structures. 100th Anniversary Earthquake Conference Commemorating the 1906 San Francisco Earthquake, San Francisco, CA, April 18–22, 2006.

Meldrum J, Gupta A, McDonald BM. Investigation of structural damage in a corrosive environment. *Proceedings, 5th International Conference on Case Histories in Geotechnical Engineering, New York, NY, April 2004.*

McDonald BM, Luth G, Osteraas J. Review of safety factors for assessing column stability in existing braced frame buildings. Proceedings, 2004 Structures Congress, The Structural Engineering Institute of the American Society of Civil Engineers, Nashville, TN, May 22–26, 2004.

Osteraas J, Bonowitz D, Gupta A McDonald BM. Development of guidelines for assessment and repair of earthquake damage in woodframe construction. 13th World Conference on Earthquake Engineering, Paper No. 1580, Vancouver, BC, Canada, August 1–6, 2004

Ross B, McDonald BM, Saraf V. Big Blue goes down: The Miller Park crane accident. Proceedings, 6th International Symposium on Risk, Economy and Safety, Failure Minimization and Analysis, Capetown, South Africa, March 8–12, 2004.

McDonald BM, Saraf V, Ross B. A spectacular collapse: The Koror-Babeldaob (Palau) balanced cantilever prestressed post-tensioned bridge. Indian Concrete J 2003; 77(3). Also in Proceedings, 27th Conference on Our World in Concrete and Structures, XXI:57–68, August 29–30, 2002.

Osteraas J, Shusto L, McDonald BM. Forensic aspects of earthquake engineering: Protocols for earthquake damage assessment and repair. Proceedings, 2nd Forensic Engineering Congress, American Society of Civil Engineers, San Juan, Puerto Rico, May 19–23, 2000.

Rau G, Meldrum J, Medley E, McDonald BM. Forensic investigations of the soil-structure kind (wind & settlement failures). Proceedings, 2nd Forensic Engineering Congress, American Society of Civil Engineers, San Juan, Puerto Rico, May 19–23, 2000.

McDonald BM, Bozorgnia Y, Osteraas J. Structural damage claims attributed to aftershocks. Proceedings, 2nd Forensic Engineering Congress, American Society of Civil Engineers, San Juan, Puerto Rico, May 19–23, 2000.

Osteraas J, Shusto L, McDonald BM. Engineering involvement in post-Northridge damage assessment and repair of wood-frame dwellings. 12th World Conference on Earthquake Engineering, New Zealand Society of Earthquake Engineering, Auckland, New Zealand, February 2000.

Moncarz PD, McDonald BM, Caligiuri RD. Earthquake failures of welded building connections. Proceedings, 6th Pan American Congress of Applied Mechanics and 8th International Conference on Dynamic Problems in Mechanics, Rio de Janeiro, Brazil, January 4–8, 1999.

Moncarz PD, Caligiuri RD, McDonald BM, Sire RA, Borduin WP. Ultimate moment capacity of many steel connections: Failure in design, materials or workmanship? EUROMAT '98 Conference on Materials in Oceanic Environment, Lisbon, Portugal, July 22–24, 1998.

McDonald BM, Sire RA, Caligiuri RD. Ductile initiation of cleavage fractures in welded moment frame connections. 12th Engineering Mechanics Conference, American Society of Civil Engineers, La Jolla, CA, May 17–20, 1998.

Moncarz PD, Caligiuri RD, McDonald BM, Sire RA. Failures in steel frame building connections—A multi-billion dollar example of professional wishful thinking. 8th Annual International Federation for Information Processing (IFIP) Working Conference on Reliability and Optimization of Structural Systems, Krakow, Poland, May 11–13, 1998.

Johnston P, Shusto L, McDonald BM. Correlating torsional response to engine performance parameters. Presentation, International Off-Highway and Power Plant Congress and Exposition, Society of Automotive Engineering, Milwaukee, WI, September 1993.

Luth GP, McDonald BM, Jain D. Qualitative formulation of load paths through a functional description of structures. Proceedings, 5th International Conference on Computing in Civil and Building Engineering, Anaheim, CA, 1993.

McDonald BM, Burke M, Moncarz PD. The effects of natural aging on a polymer modified glass fiber reinforced concrete. Proceedings, 8th Biennial Congress of the Glassfibre Reinforced Cement Association, Maastricht, Netherlands, October 1991.

McDonald BM, Peyrot A. Generalized sag-tension calculations valid for any line geometry. J Struct Div, Am Soc Civil Engin 1990; 116(9).

McDonald BM, Peyrot A. Analysis of cable suspended in sheaves. J Struct Div, Am Soc Civil Engin 1988; 114(3).

McDonald BM. Analysis of cables suspended by sheaves. Dissertation, University of Wisconsin, Madison, WI, 1988.

Peyrot AH, Dagher HJ, McDonald BM. Reliability based design of transmission line structures—Theoretical user's manual for descals, reliability analysis and design of transmission line structures. EPRI Report for Project 1352-2, January 1986.

Saul W, McDonald BM. Microcomputer-aided structural analysis. In: Computer-Aided Processes in Instruction and Research. Beakley G, Haden C (eds), Academic Press Inc., Orlando, FL, 1985.

Saul W, Tuan CY-B, McDonald BM. Loads due to human movement. In: Structural Safety Studies. Yao JTP, Corotis R, Brown CB, Moses F (eds), American Society of Civil Engineers, New York, NY, 1985.

McDonald BM. The dynamic loading due to stadium crowds: A statistical measure of the coherency of crowd movements. Thesis, University of Wisconsin, Madison, WI, 1984.

Academic Appointments

- Adjunct Professor, Stanford University

Professional Affiliations

- American Society of Civil Engineers (member)
- Structural Engineers Association of Northern California (member, Past Chair of the Research Committee, current Chair of Nonductile Concrete Subcommittee)
- American Concrete Institute (member)
- Earthquake Engineering Research Institute (member)