FANGYIN ZHANG, PH.D., P.E.

Vice President

Summary

Fangyin Zhang has over 27 years of experience in bridge engineering, specializing in structural dynamics related to wind- and seismic-resistant analysis and design. Fangyin is also an accomplished expert on finite element analysis. He has been involved in retrofit projects on several bridges including the Manhattan, Verrazano-Narrows, George Washington, Throgs Neck and Bosphorus Bridges. He is also experienced in aerodynamic analysis and wind tunnel testing for long span bridges.

Areas of Technical Expertise

- Bridge Engineering
- Engineering Seismology and Earthquake Engineering
- Finite Element Analysis

Education

- Ph.D., Engineering Seismology, 2004, State University of New York at Buffalo
- Ph.D., Bridge Aerodynamics, 1995, China Academy of Railway Sciences
- M.S., Structural Engineering, 1990, Dalian University of Technology
- B.S., Structural Engineering, 1987, Huazhong University of Science and Technology

Registrations

- Licensed Professional Engineer in NY, NJ, and MI

Professional Activities

- Member, Earthquake Engineering Research Institute (EERI), 2000-present
- Member, Seismological Society of America (SSA), 2001-present
- Member, American Society of Civil Engineers (ASCE), 2007-present

Select Project Experience

Seismic Evaluation and Retrofit

Throgs Neck Bridge [TN-53], Seismic Retrofit, New York, NY. Led and worked on seismic retrofit of approach spans, including 3D modeling of the structure, soil-structure interaction using ANSYS, and DeepSoil and CSiBridge. Assessed vulnerability of substructure, cap beams, pier columns, piles and pile caps. Retrofit measures included design and optimization of seismic isolators to replace rock bearings, retrofit drawings.

Manhattan Bridge, Seismic Retrofit, New York, NY. Performed static, modal and time history analysis of the suspended spans and approach spans with consideration of soil-structure interaction effects; performed vulnerability evaluation for the entire structure, and preliminary retrofit design.

Bosphorus Bridge, Seismic Retrofit, Istanbul, TUR.* Principal Bridge Engineer responsible for the dead load, live load, seismic load and temperature load analysis of the Bosphorus Bridge. Performed a vulnerability evaluation based on the Euro Code. Performed design and analysis of the viscous fluid dampers for seismic retrofit and fatigue renovation of steel orthotropic deck.

Verrazzano-Narrows Bridge, Seismic Retrofit of Approach Spans, NY. Analysis of the structure due to dead load, live load and seismic load using ANSYS FEM model; calculation of the bending and shear capacity of the columns and struts; create the FEM model of Brooklyn Anchorage and Staten Island Anchorage, and incorporate these models into the approach models to include the effects of the mass and mass moment inertia of the anchorages on the approach spans due to seismic load; calculation of pile cap capacity.

*Denotes work performed with previous employer.

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Analysis and Design

Lusail Suspension Bridge 8, Doha, Qatar.* Principal Bridge Engineer responsible for the dead load, live load (influence line), wind load, seismic load and temperature load analysis. Reviewed reports on wind tunnel tests and design of TMDs for controlling wind-induced vibration of hangers; performed static and dynamic hanger loss analysis; calculated concrete crack width of irregular cross sections and reviewed construction staging analysis.

Goethals Cable-Stayed Bridge, NY. Principal Bridge Engineer responsible for the dead load, live load, and temperature load analysis of the New Goethals Bridge between New York and New Jersey. Performed static and dynamic stay loss analysis.

Manhattan Bridge, Suspender Replacement, New York, NY. Performed various staging analysis to determine suspender replacement stages. Measured the forces of the suspender ropes with equalizer bar and cable socket using the accelerometers and FEM simulation.

Walt Whitman Bridge Deck Replacement, Delaware River Port Authority, PA. Analysis of geometry of the main cables; evaluation of different deck replacement options (grid deck, orthotropic deck, with/without shear connectors, etc.); performed fatigue evaluation of the deck-diaphragm-rib penetration welding of steel orthotropic deck.

Wind Engineering and Wind Tunnel Testing

Ningbo Cable-Stayed Bridge, Zhejiang, China*. Performed FEM analysis and designed the section model and full-scale aeroelastic model for wind tunnel tests; did the wind tunnel tests; using self-developed computer programs to process all the test data, and performed flutter and buffeting analysis for both construction and complete stages; wrote the report of wind tunnel tests.

Jinma Cable-Stayed Bridge, Guangdong, China*. Designed the section model for wind tunnel tests; did the wind tunnel tests; using self-developed computer programs to process all the test data and performed flutter and buffeting analysis for both construction and complete stages; and wrote the report of wind tunnel test.

Lusail Suspension Bridge, Doha, Qatar.* Review the reports of wind tunnel tests and TMD design for controlling the wind-induced vibration of the hangers.

Bosphorus Suspension Bridge, Istanbul, Turkey.* Review the reports of wind tunnel tests and TMD design for controlling the wind-induced vibration of the hangers.

Load Rating and Construction Service Support

Manhattan County Bridges, Column Load Rating and Retrofit, New York, NY. QA/QC and technical supervision; retrofit design of columns.

Thousand Island Bridge, TIBA. Principal Bridge Engineer responsible for load rating of the main cables, hangers, girders and towers, including creating the FEM model and structure analysis.

George Washington Bridge, PA, NJ and NY. Load rating of lower-level deck system.

Oakland Bay Bridge, San Francisco, CA. Stress analysis of east approach girder to validate the contractor's proposed alteration to the deck cutout during cable erection; analytical and numerical buckling analysis of longitudinal shear plate; and Pier E2 bearing alignment analysis.

Forensic Investigation

Umm Lafina Bridge, Concrete Spalling of Prestressed Concrete Box, Abu Dhabi, UAE.* Investigation of concrete spalling of prestressed concrete box girder during construction.

Kosciuszko Bridge, NY. Investigation of rotation, flattening and cracking of cable blast protection shielding, including computer simulation to investigate the cracking and deforming of the cementitious fill.

Balmoral Avenue Bridge, Chicago, IL. Investigation of concrete pier cap cracking; provided retrofit design suggestion; reviewed the retrofit design drawings.

Transbay Joint Powers Authority Bus Ramp, CA. Forensic investigation of the cracking of concrete box girder.

Select Papers, Lectures and Publications

"Seismic Isolation Retrofitting of Typical Multi-Span Steel Girder Bridges in New York State." Transportation Research Record, 2020 (co-author)

"Seismic Rehabilitation of Bridge Structures Using Passive Control Devices." EERI Lehigh University Student Chapter, 2018 (presenter)

CONTACT

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