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Engineering & Scientific Consulting

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Professional Profile

Dr. Ghahremani is a licensed Professional Engineer in the United States and Canada. His expertise includes design, condition assessment, strengthening, and forensic failure investigations of buildings and structures, fatigue and fracture of welded connections and complex structures, as well as vibration consulting. Dr. Ghahremani is skilled in utilizing structural health monitoring and advanced 3D imaging techniques, including photogrammetry and laser scanning, to detect, monitor, and establish threshold levels for structural damage in a variety of structural systems. He has designed and evaluated residential and commercial structures and has assessed structural damage due to wind, fire, ground settlement, water intrusion, excessive vibration, and material aging and degradation.

Dr. Ghahremani has conducted hundreds of on-site surveys investigating performance issues related to framing and cladding for various types of buildings and structures. He addresses problems associated with design, construction materials, means and methods of construction, construction failures, application of codes and standards, repair methodologies, and cost of repairs. He has performed field surveys of damage caused by Hurricanes Harvey, Laura, Delta, Ida, Ian, Nicole, and Beryl that affected the U.S. Gulf and Atlantic Coasts.

As part of his doctoral research, Dr. Ghahremani investigated the fatigue performance, assessment, and retrofitting of existing steel bridges and structures in the long-life regime. He conducted small and large-scale experimental programs, performed fracture mechanics and finite element simulation studies, and developed a methodology for in-service fatigue analysis of structural welds. During his post-doctoral fellowship, Dr. Ghahremani developed a methodology for vision-based structural damage detection and finite element model updating using photogrammetry and point cloud analysis.

Academic Credentials & Professional Honors

Ph.D., Civil Engineering, University of Waterloo, 2015

M.S., Civil Engineering, University of Waterloo, 2010

B.S., Civil Engineering, Sharif University of Technology, Iran, 2008

Henry O. Fuchs Award, SAE International, 2016

Licenses and Certifications

American Welding Society Certified Welding Inspector (CWI)

Prior Experience

Project Manager/ Senior Associate, Walter P Moore, 2016-2022.

Postdoctoral Fellow, Department of Civil, Environmental, and Infrastructure, George Mason University, 2015-2016.

Lecturer and Research Associate, Department of Civil and Environmental Engineering, University of Waterloo, 2008-2015.

Structural Design Engineer-In-Training, ASP Construction Company, 2007-2008

Professional Affiliations

American Society of Civil Engineers (ASCE)

ASCE 11-28 Structural Condition Assessment of Existing Buildings Committee

Committee of Forensic Investigation, ASCE Forensic Engineering Division

SAE International Fatigue Design and Evaluation Committee

Structural Extreme Events Reconnaissance (StEER) Network

Publications

K. Ghahremani, B. Bailey, & S. Amoroso (2024) “Hurricane Damage to Residential Structures: Wind Damage Overview”, Proceedings of the ASCE’s 10th Forensic Engineering Congress, Seattle, WA. pp. 274-281.

K. Ghahremani, A. Khaloo, S. Mohammadi, & D. Lattanzi (2018) “Damage Detection and Finite-Element Model Updating of Structural Components through Point Cloud Analysis”, (ASCE) Journal of Aerospace Engineering, Volume 31, Issue 5.

K. Ghahremani (2018) “Impact Treatment of Highway Bridge Welds to Enhance Durability of Steel Bridges: Mechanism, Limitations, and Design”, Proceedings of the ASCE’s Structures Congress 2018, Fort Worth, TX. pp. 24-34.

K. Ghahremani, S. Walbridge, & T. Topper (2016) “A Methodology for Variable Amplitude Fatigue Analysis of Structural Welds Based on Fracture Mechanics Analysis and Small-Scale Experiments ”, Engineering Fracture Mechanics, Volume 163

R. Ranjan, K. Ghahremani, S. Walbridge, & A. Ince (2016) “Testing and Fracture Mechanics Analysis of Strength Effects on the Fatigue Behaviour of HFMI Treated Welds”, Welding in the World, Volume 60, Issue 5.

K. Ghahremani, A. Khaloo, & D. Lattanzi (2016) “Automated 3D Image-Based Section Loss Detection for Structural Model Updating”, 33rd International Symposium on Automation and Robotics in Construction (ISARC 2016), Auburn, AL.

K. Ghahremani, S. Walbridge, & T. Topper (2015) “High Cycle Fatigue Behaviour of Impact Treated Welds under Variable Amplitude Loading Conditions”, International Journal of Fatigue, Volume 81.

M. Safa, A. Sabet, K. Ghahremani, C. Haas, & S. Walbridge (2015) “Rail Corrosion Forensics Using 3D Imaging and Finite Element Analysis”, International Journal of Rail Transportation, Volume 3, No. 3.

R. Ranjan, K. Ghahremani, S. Walbridge, & A. Ince (2015) “Testing and Fracture Mechanics Analysis of Strength Effects on the Fatigue Behaviour of HFMI Treated Welds”, IIW General Assembly (Commission XIII Meeting), Helsinki, Finland.

K. Ghahremani, R. Ranjan, S. Walbridge, A. Ince (2015), “Fatigue Strength Improvement of Aluminum and High Strength Steel Welded Structures using HFMI”, 6th Fatigue Design Conference, Senlis, France: Procedia Engineering, Volume 133, pp. 465-476.

K. Ghahremani, M. Safa, J. Yeung, S. Walbridge, C. Haas, & S. Dubois (2014), “Quality Assurance for High Frequency Mechanical Impact (HFMI) Treatment of Welds Using 3D Laser Scanning Technology”, Welding in the World, Volume 59, Issue 3.

K. Ghahremani, S. Walbridge, & T. Topper (2014), “Inhibiting Distortion-Induced Fatigue Damage in Steel Bridges by Using FRP Angles”, (ASCE) Journal of Bridge Engineering, Volume 20, Issue 6.

K. Ghahremani, S. Walbridge, & T. Topper (2014), “Fatigue Retrofitting of Web Stiffeners in Steel Bridges Using Pultruded FRP Sections”, Proceedings of the ASCE’s Structures Congress, Boston, MA. pp. 376-385.

R. Tehrani Yekta, K. Ghahremani, & S. Walbridge (2013) “Effect of Quality Control Parameter Variations on the Fatigue Performance of Ultrasonic Impact Treated Welds”, International Journal of Fatigue, Volume 55.

K. Ghahremani, A. Sadhu, S. Walbridge, & S. Narasimhan (2013), “Fatigue Testing and Structural Health Monitoring of Retrofitted Steel Highway Bridge Web Stiffeners”, Transportation Research Record, (2360).

K. Ghahremani, S. Walbridge (2012), “Fatigue Testing and Analysis of As-Welded and Retrofitted Web Stiffeners in Steel Highway Bridges”, Annual Conference of the Canadian Society of the Canadian Society for Civil Engineering, Edmonton, AB: Leadership in Sustainable Infrastructures, Volume 4, pp. 2567-2576.

K. Ghahremani, S. Walbridge (2012), “Fatigue Testing and Finite Element Analysis of Bridge Welds Retrofitted by Peening under Load”, Proceedings of the ASCE’s Structures Congress, Chicago, MI. pp. 648-656.

K. Ghahremani, S. Walbridge (2011) “Fatigue Testing and Analysis of Peened Highway Bridge Welds under In-service Variable Amplitude Loading Conditions”, International Journal of Fatigue, Volume 33, Issue 3.

K. Ghahremani, S. Walbridge. (2010), “Predicting the Effect of Post-Weld Treatments Applied under Load on the Fatigue Performance of Welds in Existing Steel Bridges”, Proceedings of the 8th International Conference on Short and Medium Span Bridges, Niagara Falls, ON. pp. 1141-1151.

M. Ghahremani, A. Ghalandarzadeh, H.Nowamooz, & K. Ghahremani (2007), “A Comprehensive Study on the Monotonic Behaviour of Sand-Clay mixtures”, Proceedings of the 60th Canadian Geotechnical Conference, Ottawa, ON. pp. 1858- 1864.

M. Ghahremani, A. Ghalandarzadeh, & K. Ghahremani (2007), “Laboratory Investigation of the Effect of Plastic Fines on Cyclic Resistance of Sand-Clay Mixtures”, Proceedings of the 4th International Conference on Earthquake Geotechnical Engineering, Thessaloniki, Greece. P# 1166.

Project Experience

Structural design and retrofit
Led a diverse range of projects across various sectors in the United States and Canada including steel, concrete, and wood design and retrofit. Notable examples include relocations of central utility plants, design and construction of flood protection for multi-building campuses, foundation strengthening of buildings, retrofit of hyperbolic cooling towers, design of DOT's steel girder bridges and pedestrian bridges, evaluation and design of fall protection systems, pavement design and evaluation, and analysis and repair of post-tensioned girders.

Managed construction projects from the schematic design phase through design development, the bidding process, construction drawings, construction administration, and commissioning.

Vibration consulting and structural health monitoring
Provided vibration consulting to help clients understand project vibration requirements, resolve vibration issues arising from interference with sensitive equipment and occupant complaints, and monitor vibration levels in adjacent buildings during construction and demolition activities such as pile driving and blasting. Notable projects include commercial and residential buildings, pedestrian bridges, cantilever grandstands, cantilever mezzanines, screening towers, precast seating units, and feasibility studies for development plans located near train tracks and highways.

Designed and implemented structural health monitoring systems comprised of accelerometers, inclinometers, and strain gauges for residential buildings, hospitals, and cooling towers to assess the structural integrity of the in-service facilities.

Hurricane risk and damage assessment
Conducted surveys and assessed the structural integrity of residential and commercial buildings following hurricane events since Hurricane Harvey in 2017 in Texas, Louisiana, and Florida. Examples include comprehensive evaluations of storm-damaged properties to identify structural vulnerabilities and recommend necessary repairs to ensure safety and compliance with building codes, conducting thorough inspections and assessments in various communities, focusing on both immediate damage and long-term impacts of flooding and high winds, and collaborating with stakeholders to facilitate effective recovery efforts.

Historic preservation
Contributed to historic and art-related projects, focusing on preservation and structural integrity. Notable examples include relocation of the Virtuoso Statue and mosaic relocation and restoration of the Arms of Christ mural in Houston, exterior façade and roof repairs of historic buildings while maintaining their architectural heritage, and assessment of the Magoffin Home Visitor Center for the Texas Historical Commission.

Litigation and arbitration support
Provided expert support in projects involving structural failure damage and investigation, service issues, construction defect disputes, and cost overruns and delays associated with design and construction modifications, as well as the roles and responsibilities of engineers during various phases of demolition and construction.