Pratik P. Bhatt PhD

Senior Staff Consultant

Dr. Pratik Bhatt is a Senior Staff Consultant at Engineering Systems Inc. (ESi). He specializes in advanced structural analysis and forensic examination of structures compromised by natural or manmade hazards. His work focuses on detailed scientific investigation, thorough field inspection, and uncovering root-cause of failures in a wide range of structural systems. As a forensic structural engineer, Dr. Bhatt has experience in application of international building codes (IBC, ASCE, ACI, AISC, & ASTM) to design effective repair and retrofit solutions for compromised structures, using traditional and composite materials.

Dr. Bhatt has a strong background in engineering mechanics, strength of materials, and nonlinear finite element based computational modeling which is complemented by his proficiency in industry-standard software and programming languages. In addition to his analytical background, Dr. Bhatt has extensive experience in utilizing state-of-the-art laboratory equipment as well as developing and executing cutting-edge testing techniques for characterizing behavior of structures and materials under extreme conditions, such as fire and blasts. He also has expertise in implementing artificial intelligence (AI) and machine learning (ML) for developing tools for predicting fire resistance of concrete structures. Dr. Bhatt has published several articles in peer-reviewed scientific journals, conferences, and books from his doctoral research which was aimed at developing a fundamental understanding of the thermo-mechanical response of fiber-reinforced polymer (FRP)-strengthened concrete flexural members under fire exposure.

At ESi, Dr. Bhatt leverages his comprehensive expertise in forensic analysis, computational modeling, and AI/ML innovations to address a broad spectrum of structural engineering challenges including damaged structures or failure of mechanical systems or components. Dr. Bhatt is passionate about implementing AI/ML for tackling structural engineering challenges and developing innovative solutions. He is committed to developing multi-hazard resistant structures and novel material applications for infrastructure resilience, making him a crucial resource for clients looking for cutting-edge and dependable engineering solutions.

Positions Held

Engineering Systems Inc., Aurora, Illinois

- Senior Staff Consultant, 2024 – Present

Walter P Moore, Kansas City, Missouri

- Structural Forensic Engineer Diagnostics Group, 2022 - 2024

Michigan State University, East Lansing, Michigan

- Teaching and Research Assistant, 2014 – 2021

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ESi
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Education

Ph.D., Civil Engineering, Michigan State University, 2021

M.S. (R), Civil Engineering (Structural), Indian Institute of Technology (IIT) Delhi, 2014

B.E., Civil Engineering, Maharaja Sayajirao University of Baroda, 2010

Areas of Specialization

Advanced Structural Analysis
Computational Modeling
Damage Assessment
Data Analysis and Visualization
Design of Steel and Concrete Structures
Engineering & Failure Analysis
Experimental Analysis
Machine Learning and Artificial Intelligence
Programming in Fortran, Matlab, Python
Repair and Renovation Design
Structural Fire Engineering
Structural Strengthening using Polymer Composites

Indian Institute of Technology (IIT) Delhi, New Delhi, India

- Research Assistant, 2021 – 2014

Linde Engineering India Pvt. Ltd., Vadodara, India

- Structural Design Engineer, 2010

Training and Certification

- OSHA 30 Hour General Industry Outreach
- OSHA Confined Space Certification - National OSHA Foundation
- Overhead Crane Inspector - Qualified

Professional Affiliations

Member National Academy of Forensic Engineers (NAFE)

Member American Society of Civil Engineers (ASCE)

Member American Concrete Institute (ACI)

Committees:

216-00 Fire Resistance and Fire Protection of Structures--Joint ACI-TMS

440-00 Fiber-Reinforced Polymer Reinforcement

440-0F FRP-Repair-Strengthening

Honors/Awards

- Department of Civil and Environmental Engineering Dissertation Completion Fellowship, 2020
- Indo-US Science and Technology Forum (IUSSTF) Fellowship for Advancement of Structural Fire Engineering Research in India, 2014
- GATE Fellowship from Government of India, 2011-2013
- 3 gold medals for Outstanding Academic Performance in B.E. Civil, 2010

Technical Publications & Presentations

Refereed Journal Papers:

Bhatt, P. P., Sharma, N., Kodur, V. K. R., and Naser, M. Z. (2024) “Machine Learning Approach for Predicting Fire Resistance of FRP-Strengthened Concrete Beams.” *Structural Concrete*, *fib CEB-FIP*, https://doi.org/10.1002/suco.202400466

Bhatt P. P., and Kodur, V. K. R. (2023). “Methodologies for Evaluating FRP-Concrete Interfacial Bond Strength at Elevated Temperatures.”. *Fiber Reinforced Polymeric Materials and Sustainable Structures*, 19-31.

Kodur, V. K. R., Venkatachari, S., **Bhatt, P. P.**, Matsagar, V., and Singh, S. B. (2023). "Fire Resistance Evaluation of Concrete Beams and Slabs Incorporating Natural Fiber-Reinforced Polymers." *Polymers*, 15 (3), 755.

Kodur, V. K. R., and **Bhatt, P. P.** (2022). "Fire hazard in Tunnels: Review, Assessment, and Mitigation strategies." *The Indian Concrete Journal*, Special Issue, 96(3), 13-25.

Bhatt, P. P., and Sharma, N. (2021). "Deep Neural Network to Predict Fire Resistance of FRP-Strengthened Beams." The Concrete Industry in the Era of Artificial Intelligence, SP-350, *American Concrete Institute*, 69-80.

Bhatt, P. P., Kodur, V. K. R., Shakya, A. M., Alkrdaji, T. (2020). "Performance of Insulated FRP-strengthened Concrete Flexural Members under Fire Conditions." *Frontiers of Structural and Civil Engineering*, 15, 177-193.

Kodur, V. K. R., **Bhatt, P. P.**, and Naser M. Z. (2019). "High Temperature Properties of Fiber Reinforced Polymers and Fire Insulation for Fire Resistance Modeling of Strengthened Concrete Structures." *Composites Part B: Engineering*, 175, https://doi.org/10.1016/j.compositesb.2019.107104.

Bhatt, P. P., Kodur, V. K. R., and Matsagar, V. (2019). "Numerical Approach to Evaluate Elevated Temperature Behavior of Steel Fiber Reinforced Concrete Columns." *The Indian Concrete Journal Special Issue*, 93(8), 8-15.

Kodur, V. K. R., and **Bhatt, P. P.** (2018). "A Numerical Approach for Modeling Response of Fiber Reinforced Polymer Strengthened Concrete Slabs Exposed to Fire", *Composite Structures*, 187, 226-240.

Kodur, V. K. R., **Bhatt, P. P.**, Soroushian, P., and Arablouei, A. (2016). "Temperature and Stress Development in Ultra-High-Performance Concrete during Curing." *Construction and Building Materials*, 122, 63-71.

Refereed Conference Papers in Proceedings:

Bhatt, P. P., Kodur, V. K. R., Hawileh, R., Al-Nuaimi, N., and Abdalla, J. (2019). "Effect of Temperature Induced Bond Degradation on Fire Performance of FRP-Strengthened Concrete Beams." *7th International Colloquium on Performance, Protection & Strengthening of Structures Under Extreme Loading & Events (PROTECT 2019)*, Sep. 16-17, Whistler, Canada

Bhatt, P. P., Kodur, V. K. R., Shakya, A. M., Alkrdaji, T. (2019). "Fire Resistance of Insulated FRP-Strengthened Concrete Flexural Members." *9th International Conference on Concrete Under Severe Conditions - Environment & Loading (CONSEC 2019)*, Jun. 5-7, Unisinos University, Porto Alegre/RS, Brazil.

Bhatt, P. P., Kodur, V. K. R., Hawileh, R., Al-Nuaimi, N., and Abdalla, J. (2018). "Numerical Model for Fire Resistance Evaluation of Steel Reinforced Polymer Strengthened Concrete Beams." *The 10th International Conference on Structures in Fire (SiF 2018)*, Jun. 6-8, FireSERT, Ulster University, Belfast, UK.

Kodur, V. K. R., and **Bhatt, P. P.** (2016). "Strategies for Mitigating Fire Hazard in Tunnel Structures." *The 6th International Workshop on Structural Life Management of Power Structures*, KEPCO-RI, Daejeon, Korea 1-12.

Kodur, V. K. R., **Bhatt, P. P.**, and Matsagar, V. (2016). "Numerical Study on Steel Fiber Reinforced Concrete Columns Subjected to Fire." *9th International Conference on Structures in Fire (SiF 2016)*, Jun. 8-10, Princeton University, Princeton, NJ, USA.

Kodur, V. K. R., Naser, M., **Bhatt P. P.** (2015). "Emerging Construction Materials for Energy Installations." Proceedings of CAETS Convocation on Pathways to Sustainability, Oct. 13-14, Delhi, India.

Bhatt, P., Matsagar, V. A., and Nagpal, A. K. (2014). "Reinforced Concrete Portal Frame Subjected to Fire." National Conference on Fire Research and Engineering, Mar. 2-3, IIT Roorkee, Uttarakhand, India.

Book Chapters and Thesis:

Kodur, V. K.R., and **Bhatt, P. P.** (2024) "Thermomechanical Properties of Constituent Materials for Evaluating Fire Resistance of FRP-Strengthened Concrete Structures." *In Construction Materials and Their Properties for Fire Resistance and Insulation*, Chapter 15, eds. Paul O. Awoyera, and M.Z. Naser, Woodhead Publishing, 301-339.

Bhatt, P. P. (2021). "Fire Performance of FRP-Strengthened Concrete Flexural Members." Ph.D. Thesis, Department of Civil & Environmental Engineering, Michigan State University, East Lansing, MI.

Kodur, V.K.R., Naser M., and **Bhatt, P. P.** (2017). "Emerging Construction Materials for Energy Infrastructure." Energy Engineering, Springer, Singapore, 113-122.

Bhatt, P. P. (2014). "Fire Performance of Steel Fiber Reinforced Concrete Portals." MS(R) Thesis, Department of Civil Engineering, Indian Institute of Technology (IIT) Delhi, New Delhi, India.

Presentations and Seminars:

Bhatt, P. P. (2021) "Fire Performance of FRP-Strengthened Concrete Flexural Members." Thornton Tomasetti, Nov. 19, New York, NY, USA

Bhatt, P. P. (2021) "Fire Performance of FRP-Strengthened Concrete Beams." Gilsanz Murray Steficek Engineers and Architects, May 27, New York, NY, USA

Bhatt, P. P. (2020) "Thermo-Mechanical Response of FRP-Strengthened RC Structures under Fire Conditions." Nuclear Science Engineering Seminar, Massachusetts Institute of Technology, Jul. 27, Cambridge, MA, USA.

Bhatt, P. P. (2017) "Fire Performance of Concrete Slabs Strengthened with Fiber Reinforced Polymers." ACI Spring 2017 "The Concrete Convention" Mar. 26-27, Detroit Renaissance Center, Detroit, MI, USA.