

Alaa T. Al-Sammari

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EDUCATION

University of Massachusetts Amherst

Ph.D. in Civil Engineering, Structural Engineering and Mechanics

May 2019

GPA 3.88/4.00

Dissertation: Finite Element Simulation of Bonded and Mechanically Anchored Shear Interfaces of Externally Applied FRP Sheets to Concrete and Wood-Concrete Composites

University of Tikrit

B.Sc. and M.Sc. in Civil Engineering

PROFILE SUMMARY

- A civil engineer with experience in the civil and structural design of residential and industrial buildings, rehabilitation of structures, and structural analysis. Previous work includes designing various structural elements: concrete foundations, beams, columns, and concrete slabs. Design experience includes using SAFE, SAP 2000, STAAD, and ABAQUS software programs for designing buildings and other structures according to the ACI, AISC, AASHTO, and ASCE Standards and Specifications.
 - Other fields of experience include:
 - Knowledge of AASHTO LRFD Bridge Design Specifications and the CSI bridge design software program.
 - Designing wood structures according to the NDS Standards and using WoodWorks® Design Software program.
 - Analysis of structural systems subjected to lateral forces, including wind and seismic forces.
 - The rehabilitation and retrofitting design of concrete and steel structures using carbon fiber reinforced polymers and other strengthening materials.
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WORK EXPERIENCE

University of Massachusetts, Amherst

Research Associate

2016-present

Developing simulation capabilities for structural systems subjected to severe earthquake demands

The performance of structural systems subjected to seismic events was investigated through the analysis of experimental seismic data. Hysteresis data were extracted using several analytical and numerical procedures. The research addressed many modifications to the design formulas of the current design guidelines. These modifications are required to count for possible deficiencies of structural systems subjected to seismic loads such as shear, flexural, and splice deficiencies. The research included the following:

- Analyzing damage and measuring residual strengths of structural systems subjected to seismic loads. Damage data were extracted from hysteresis test datasets using a computer code that is designed for this purpose. The extracted data help in identifying seismic deficiencies in structures and making retrofitting decisions.
- Developing Finite Element Models for structures subjected to severe earthquake demands. The models have been developed for the Open System for Earthquake Engineering Simulation (OpenSees) to provide critical engineering data that enhance seismic resilience.

This project is funded by the National Institute of Standards and Technology (NIST), Gaithersburg, Maryland. The results of the research have been reported to NIST in semi-annual reports. Furthermore, research results were presented in two conferences at the National Institute of Standards and Technology (NIST) headquarters.

Graduate Research Assistant

Effect of rehabilitation with externally bonded fiber-reinforced polymer sheets on concrete elements

A new approach to quantify the strength of bonded fiber-reinforced polymer (FRP) sheets to concrete that include FRP spike anchors has been developed. Finite element simulations calibrated with previous experimental test data were used to quantify bond strength. Relevant parameters that affect the strength of anchored FRP sheets are identified. This research work presents an anchorage efficiency factor that can be incorporated in the ACI 440.2R design guide to account for the increase in strength provided by FRP spike anchors above the strength developed by bonding FRP sheets to concrete using adhesives only. The research included the following:

- Developing a new finite element model to analyze and study the behavior of concrete members strengthened with externally bonded fiber-reinforced polymers.
- Developing a new approach to quantify the additional strength attained due to the use of the FRP anchorage system.
- Conducting a parametric study to provide an applicable modified formulation for designing FRP sheets-to-concrete anchorage systems.
- Results of the research have been reported in two journal publications(1 published, 1 submitted), and research results were presented in three conferences.

A parametric study on the behavior of wood-concrete composite systems

Simulations to study the impact of varying different parameters of a new concrete-wood system were conducted using a general-purpose FE software program (ABAQUS). The new composite system employs shear connectors to transfer shear stresses between the wood and the concrete leading to full or partial composite action for strength and stiffness benefits. Four separate components of the system were modeled: concrete, wood, the steel connector plate, and the adhesive between the plate and wood beam. Several recommendations were made to provide design guidelines.

This project is funded by the Building and Construction Technology Program at the University of Massachusetts. The results of the research have been reported in one journal publication.

OVERSEAS EXPERIENCE

Civil Engineer, Projects Management Office, City of Samarra, Iraq

Worked with a team of engineers in projects funded by the US Army to improve several infrastructure projects in the city of Samarra, Iraq

This job involves:

- Responsibility for the analysis, design, and development of project documents.
 - Working with a team of architects, mechanical, chemical, environmental, and civil engineers to design several buildings that are used to produce pharmaceutical products (Penicillin, Cephalosporin, and medical syrups). The work involves designing concrete foundations, beams, columns, and concrete slabs.
 - Structural analysis and design of three 64,800 square foot reinforced concrete buildings for the pharmaceutical production of Penicillin, Cephalosporin, and medical syrups. Used STAAD-pro for modeling and designing the structural frames, SAFE2000 to design the foundations of the buildings, and AutoCAD to draw the details.
 - Using hand calculations to determine and check that the design is according to the Minimum Design Loads and Associated Criteria for Buildings and Other Structures (ASCE/SEI 7) that determines dead, live, soil, rain, earthquake, wind loads, and their combinations.
 - Checking that the design is according to the ACI-318 code requirements for the design and construction of structural concrete that are necessary to ensure public safety.
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SELECTED PUBLICATIONS

1. **Al-Sammari, A. T.**, Clouston, P.L. and Breña, S.F., "Finite-Element Analysis and Parametric Study of Perforated Steel Plate Shear Connectors for Wood-Concrete Composites." Journal of Structural Engineering; 2018, Vol. 144, No. 10.
2. **Al-Sammari, A. T.**, and Breña, S.F., "Finite Element Simulation and Parametric Study of Anchored Fiber-Reinforced Polymer Sheets." ACI Structural Journal; 2018, Vol. 115, No. 2.
3. **Al-Sammari, A. T.**, and Breña, S.F., "Strength of Externally Applied FRP Sheets with Supplemental FRP Spike Anchors Bonded to Concrete Elements," Under review.
4. Ghannoum, W., Matamoros, A., Brena S., Suselo, A., Ghorbani, R., Zad, N., and **Al-Sammari, A.**, "Decision-Oriented Column Simulation Capabilities for Enhancing Disaster Resilience of Reinforced Concrete Buildings," 17th World Conference on Earthquake Engineering, 17WCEE, Sendai, Japan - September 13th to 18th 2020, abstract accepted.

5.

PRESENTATIONS & CONFERENCES

- "Decision-Oriented Column Simulation Capabilities for Enhancing Disaster Resilience of Reinforced Concrete Buildings: Jacketed Reinforced Concrete Columns," 2019 Disaster Resilience Symposium, The National Institute of Standards and Technology (NIST), Gaithersburg, Maryland, United States of America.
- "A Procedure to Determine Anchorage Requirement of FRP Sheets used to Strengthen RC Flexural Members," Structures Congress, organized by the American Society of Civil Engineers, April 25-27, 2019, Orlando, Florida, United States of America.
- "A Proposed Approach and Formulation to Determine Debonding Strain Limit of FRP Sheets Anchored with FRP Spike Anchors," The ACI Convention and exposition, organized by the American Concrete Institute, October 14-18, 2018, Las Vegas, Nevada, United States of America.
- "A New Approach to Determine Debonding Strain Limit of FRP Sheets Anchored with FRP Spike Anchors," The ACI Convention and exposition, organized by the American Concrete Institute, March 25-29, 2018, Salt Lake City, Utah, United States of America.
- The ACI Convention and exposition, organized by the American Concrete Institute, October 15-19, 2017, Anaheim, California, United States of America.

CERTIFICATIONS

- Internet and Computing Core Certification - IC3 (Standard Key Applications).
- OSHA Safety Certification - Presented by the Association of Commercial and Institutional Builders-AGC Safety and Construction Services, Amherst, Massachusetts, 2015.

COMPUTER SKILLS

- Simulation Software: MATLAB, C++, Python, Visual BASIC, FORTRAN.
- Civil Engineering Software: ADINA, ABAQUS, SAP2000, STAAD-PRO, SAFE2000, AutoCAD, Visual Analysis, Wood Works.
- General Software: Microsoft Office (Word, Excel, Access, and PowerPoint), Grapher, Surfer.
- Earthquake Engineering Software: OpenSees.

PROFESSIONAL AFFILIATIONS/MEMBERSHIPS

- American Society of Civil Engineers (ASCE), Associate Member. 2016 - Present
- American Institute of Steel Construction (AISC), Member. 2015 - Present
- American Concrete Institute (ACI), Member. 2014 - Present