



Ravi Mullapudi, Ph.D., P.E.

SENIOR ENGINEER

Dr. Mullapudi is a structural engineer with a focus in forensics, analysis, design, and strengthening of residential, commercial, onshore, nuclear, petrochemical, and environmental structures for normal design loads, natural, and man-made disasters including earthquake, blast, impact, fire, and hurricane extreme loadings. Dr. Mullapudi has also spent several years in research and development working on inelastic finite element models under static and dynamic loads for structural systems subjected to combined axial, shear, flexure and torsional loads, and models for soil-structure interaction. He has conducted nondestructive testing on concrete mixed with carbon-nanofibers, studied the behavior of connections between concrete and steel, and developed constitutive models for reinforced concrete structures.

Academic Credentials

Ph.D. in Civil Structural Eng.
University of Houston, 2010

M.S. in Civil Structural Eng.
Missouri University of Science
and Technology, 2007

M.S. in Civil Structural Eng.
Indian Institute of Technology
Madras, India, 2004

B.S. in Civil Engineering
National Institute of Technology
India, 2002

Licensure/Certification

Professional Engineer
CA, KY, LA, MA, NC, TX

LEED AP BD+C

NCEES

Affiliations

American Society of Civil
Engineers

American Concrete Institute

American Institute of Steel Cons.

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Representative Project Experience

Forensic Investigation

- Forensic evaluations were conducted for several residential and industrial structures. Evaluated the structures under truck impacts, fire and foundation settlement. Developed a list of building structural issues and repair options. Worked in conjunction with the contractor, emergency shoring was designed, detailed, and installed. Subsequent to the stabilization of the structure, identified all of the damaged components and provided plans and specifications to restore the damaged structural elements to a code compliant condition. In few occasions, developed a cost estimate for the proposed repairs.
- Inspected railroad and highway road bridges. The decks of bridges were submerged during a flood. Inspected each component of the bridge and gave a detailed report on failures (cracking, corrosion, spalling, rotting etc.). Suggested retrofitting strategies to strengthen the bridges.

Severe Loading

- Performed blast evaluation and designed the single, double, four and twenty module complexes and stackables. Responsible for the design of buildings ranging from 20' to 120' length, 12' to 80' width with one to two story height. Developed a 3D finite element models using finite element programs and evaluated the structural response and the adequacy of the member sizes and connections for specified design loads. Designed pad eyes and transportation supports.
- Conducted blast evaluation, retrofit design and cost estimation for office and control buildings for petrochemical facilities. The Office Building (126'x110'x11' high) and Control Building (165'x63'x15' high) were constructed in several stages between 1960 to 2003 using different materials including masonry, reinforced concrete and steel. Based on Single Degree of Freedom (SDOF) analysis, several lateral and vertical force resisting systems (Flexicore concrete slabs, steel beams, CMU walls, etc.) were evaluated.
- Performed Passive Fire Protection (PFP) and Cryogenic Protection Optimization analysis for a LNG Facility. Responsible for the assessment of jet, spray and pool fire events. Multiple release directions were considered for the jet and spray fire scenarios, which resulted in several hundred finite element analyses carried out as part of the optimization process. Also conducted Passive Cryogenic Spill Protection (PCSP) optimization studies.

Normal Design Loading

- Designed a pump station masonry building for the US Air Force at Wake Island. The building is a single-story concrete masonry unit (CMU) bearing wall structure with a

concrete roof deck supported by a concrete roof beams, CMU walls and concrete floor. Designed the building with high seismic and wind loads. Prepared the construction notes and the drawing sketches.

- Designed a precast concrete lagging panel in a soldier pile wall to meet the requirements of applicable building codes.
- Designed a concrete sediment basin of bottom Ash Ponds for a power company. The overall dimensions of the concrete sediment basin structure are 336' long, 182' wide, and 15' deep. Basin design conformed to the requirements of the codes under cold weather.

Nuclear

- Conducted aircraft impact assessment of nuclear power plant structures. Lead Engineer responsible for the development of a realistic commercial aircraft model using LS-DYNA. Performed impact analysis and design of three critical structures, Reactor Containment Building (RCB), Spent Fuel Pool (SFP) and Auxiliary Building (AB) against large commercial aircraft. Designed the steel-concrete composite walls for the AB as necessary to resist the aircraft impact loadings. Developed the shock response spectra for RCB, SFP and AB.
- Performed analysis and designed honeycomb crash pads to absorb the energy in case of accidental drop of nuclear fuel filled flasks. Peak impact load between the heavy flasks and the honeycomb crash pad and the peak deceleration of the flasks were evaluated using a finite element software when the nuclear fuel filled heavy flasks have dropped on the honeycomb crash pad. Two types of flask were used, the End Fitting Flask (EFF) and the Pressure Tube/Calandria Tube Flask (PT/CT-F).

Offshore

- Assessed the behavior of a four-leg platform for the Exploration Company located in the Gulf of Mexico. The depth of the water is about 390'. Designed the platform structure, foundation subjected to wind, wave, and current loads.
- Designed the 4'x6' caisson in Gulf of Mexico at a water depth of 75' and penetration of 150'. Used the 100 year return period as the meteorological criteria. Designed the platform subjected to wind, wave and current.

Stress Analysis

- Worked on finite element modelling, thermal, structural, dynamic analysis, LCF, HCF + Creep life calculations of gas turbine structures. Responsible for team quality deliverables of Gas Turbine buckets, nozzle and shrouds. Performed the finite element analysis. The types of analyses include static, dynamic and thermal stress, modal, linear and nonlinear material analysis, geometric nonlinear analysis, contact analysis and sub-modeling analysis. Achieved the 6 Sigma Green Belt on a project.

Publications

Mullapudi, T.R.S., and Ayoub, A.S., "Fiber Beam Analysis of Reinforced Concrete Members with Cyclic Constitutive and Material Laws," International Journal of Concrete Structures and Materials, 2018, 12(51), 2018, pp. 1-16.

Mullapudi, T.R.S., Mentos, Y., "Blast Response Simulation of Reinforced Concrete Panels," American Concrete Institute Special Publication, SP-306, ACI, Farmington Hills, MI, 2016.

Mullapudi, T.R.S., and Ayoub, A.S., "Analysis of Reinforced Concrete Columns Subjected to Combined Axial, Flexure, Shear and Torsional Loads," Journal of Structural Engineering, ASCE, 139(4), 2013, pp. 561-573.

Mullapudi, T.R.S., and Ashraf A., "Nonlinear Analysis of Reinforced Concrete Walls under Three-Dimensional Loading," Magazine of Concrete Research, ICE, 65(3), 2012, pp. 172-184.

Mullapudi, T.R.S., and Ayoub, A.S., "Modeling of the Seismic Behavior of Shear-Critical Reinforced Concrete Columns," *Engineering Structures*, 32(11), 2010, pp. 3601-15.

Mullapudi, T.R.S., and Ayoub, A.S., "Fiber Beam Element Formulation using the Softened Membrane Model," *American Concrete Institute Special Publication, SP-265*, ACI, Farmington Hills, MI, 2009, pp. 283-308.

Mullapudi, T.R.S., Charkhchi, P. and Ayoub, A.S., "Evaluation of Behavior of Reinforced Concrete Shear Walls through Finite Element Analysis," *American Concrete Institute Special Publication, SP-265*, ACI, Farmington Hills, MI, 2009, pp. 73-100.

Mullapudi, T.R.S., and Ayoub, A.S., "Inelastic Analysis of Semi-Infinite Foundation Elements," *Mechanics Research Communications*, 37(1), 2010, pp. 72-77.

Mullapudi, T.R.S., and Ayoub, A.S., "Nonlinear Finite Element Modeling of Beams on Two-Parameter Foundations," *Computers and Geotechnics*, 37(3), 2010, pp. 334-342.

Mullapudi, T.R.S., Charkhchi, P. and Ayoub, A.S., "Behavior of Shear-Dominant Thin-Walled RC Structures," *Thin-Walled Structures*, V. 63, 2013, pp. 134-146.

Bora, G., Mullapudi, T.R.S., Sami, K., and Mustafa, E., "Capacity Assessment of the Titus Tunnel Bridge Using Analytical and Numerical Techniques," *Journal of Performance of Constructed Facilities*, ASCE, 28(2), 2012, pp. 349-362.

Mullapudi, T.R.S., and Ayoub, A.S., "Constitutive Behavior of Reinforced Concrete Beam-Columns under Cyclic Loading," *Studies and Researches: Annual Review of Structural Concrete*, Politecnico di Milano, V. 32, 2013, pp. 1-38.

Labib, M., Mullapudi, T.R.S., and Ayoub, A.S., "Analysis of RC Structures Subjected to Multi-Directional Shear Loads," *Journal of Advanced Concrete Technology*, V. 11, 2013, pp. 22-34.

Mullapudi, T.R.S., Gao, D., and Ayoub, A.S., "Nondestructive Evaluation of Carbon-Nanofiber Concrete," *Magazine of Concrete Research*, ICE, V. 65 (18), 2013, pp. 1081-1091.

Moslehy, Y., Labib, M., Ayoub, A.S., and Mullapudi, T.R.S., "Influence of Fiber-Reinforced Polymer Sheets on the Constitutive Relationships of Reinforced Concrete Elements," *Journal of Composites for Construction*, ASCE, 2015.

Moslehy, Y., Labib, M., Mullapudi, T.R.S., and Ayoub, A.S., "Development of a New Constitutive Model for Analysis of RC Elements Retrofitted with FRP," *American Concrete Institute Special Publication, SP-301*, ACI, Farmington Hills, MI, 2015.

Books

Mullapudi, T.R.S., "Seismic Behavior of Headed Anchors Embedded in Concrete," *Lap Lambert Academic Publishing*, ISBN: 978-3-659-25819-0, 2012, pp. 226

Mullapudi, T.R.S., "Soil Structure Interaction with Nonlinear Beam Element," *Lap Lambert Academic Publishing*, ISBN: 978-3-659-25353-9, 2012, pp. 56

Conferences and Seminars

Mullapudi, T.R.S., Summers, P., Moon, I. "Impact Analysis of Steel Plated Concrete Wall," ASCE Structures Congress, Chicago, IL, March 29- 31, 2012.

Mullapudi, T.R.S., Ayoub, A.S., "Analysis of Concrete Structures Reinforced with Carbon Nano-Fibers," IABSE Conference, Cairo, Egypt, May 7-9, 2012.

Mullapudi, T.R.S., Ayoub, A.S., "Seismic Analysis of Bridge Columns under Axial, Flexure, Shear and Torsional Loadings," ASCE Structures Congress, Las Vegas, Nevada, April 14- 16, 2011.

Mullapudi, T.R.S., Howser, R., Mo, Y.L. and Ayoub, A.S., "Analysis of RC Structures with Carbon-Nanofiber Concrete," ASCE Structures Congress, Las Vegas, Nevada, April 14- 16, 2011.

Mullapudi, T.R.S., Gao, D., Mo, Y.L. and Ayoub, A.S., "UPV Method for Detecting Properties of Carbon-Nanofiber Concrete," ASCE Structures Congress, Las Vegas, Nevada, April 14- 16, 2011.

Mullapudi, T.R.S., and Ayoub, A.S., "A 3D In-Elastic Beam Element Model for RC Members Subjected to Earthquake Loading," 14th European Conference on Earthquake Engineering (14ECEE), Ohrid, Republic of Macedonia, Aug. 30- Sept. 03, 2010.

Mullapudi, T.R.S., and Ayoub, A.S., "Behavior of Tensionless foundation with an Improved Winkler Model Subjected to Earthquake Loading," 14th European Conference on Earthquake Engineering (14ECEE), Ohrid, Republic of Macedonia, Aug. 30- Sept. 03, 2010.

Mullapudi, T.R.S., Ayoub, A.S., "Nonlinear Analysis of RC Structures through Constitutive Modeling," ASCE Engineering Mechanics Institute Conference, Los Angeles, CA, August 8-11, 2010.

Mullapudi, T.R.S., Ayoub, A.S., "In-Elastic Modeling of Soil Structure Interaction," ASCE Engineering Mechanics Institute Conference, Los Angeles, CA, August 8-11, 2010.

Mullapudi, T.R.S., Ayoub, A.S., "Soil Structure Interaction through Two Parameter Foundation," Proc. ASME 29th International Conference on Ocean, Offshore and Arctic Engineering (OMAE'10): Volume 1, Shanghai, China, June 6-11, 2010, pp. 699-704.

Mullapudi, T.R.S., Ayoub, A.S., "Development of Analysis Tools for RC Members Subjected to Three-Dimensional Combined Loads," ASCE + AISC Analysis and Computation Conference / Structures Congress/North American Steel Construction Conference (NASCC), Orlando, FL, May 12- 14, 2010.

Charkhchi, P., Mullapudi, T.R.S. and Ayoub, A.S., "Fiber Beam Formulation for Analysis of Shear-Critical Reinforced Concrete Shear Walls," ASCE + AISC Analysis and Computation Conference / Structures Congress/North American Steel Construction Conference (NASCC), Orlando, FL, May 12- 14, 2010.

Mullapudi, T.R.S., Ayoub, A.S., "Seismic Analysis of Beams on Two-Parameter Foundations," ASCE + AISC Analysis and Computation Conference / Structures Congress/North American Steel Construction Conference (NASCC), Orlando, FL, May 12- 14, 2010.

Mullapudi, T.R.S., Ayoub, A.S., "Coupled Model for Nonlinear Analysis of Reinforced Concrete Members Subjected to 3D Loading," Earth + Space 2010, ASCE, Honolulu, HI, March 14- 17, 2010.

Mullapudi, T.R.S., Charkhchi, P. and Ayoub, A.S., "Evaluation of Shear critical Shear Walls with the Fiber Element," Earth + Space 2010, ASCE, Honolulu, HI, March 14- 17, 2010.

- Mullapudi, T.R.S., Ayoub, A.S., "Nonlinear Vlasov Foundation Model for Performance Assessment of Cyclically Loaded Structures," Earth + Space 2010, ASCE, Honolulu, HI, March 14- 17, 2010.
- Mullapudi, T.R.S., Ayoub, A.S., "Non-Linear Finite Element Analysis of Concrete Structures with Softened Membrane Model," Structures Congress 2009-Expanding Our Role, ASCE, Austin, TX, April 30 – May 02,.2009.
- Mullapudi, T.R.S., Ayoub, A.S., "Fiber Model Analysis of RC Elements Subjected to Torsion," Structures Congress 2009-Expanding Our Role, ASCE, Austin, TX, April 30 – May 02,.2009.
- Mullapudi, T.R.S., Ayoub, A.S., "Inelastic Analysis of Foundation Structures," Structures Congress 2009-Expanding Our Role, ASCE, Austin, TX, April 30 – May 02,.2009.
- Mullapudi, T.R.S., Ayoub, A.S., Abdeldjelil Belarbi, "A Fiber Beam Element with Axial, Bending and Shear Interaction for Seismic Analysis of RC Structures" 14WCEE 2008, The 14th World Conference on Earthquake Engineering, Beijing, China, Oct 12 -17, 2008.
- Mullapudi, T.R.S., Ayoub, A.S., Abdeldjelil Belarbi, "Effect of Coupled Shear-Bending Deformations on the Behavior of RC Highway Structures Subjected to Extreme Seismic Loading" 6NSC 2008, The Sixth National Seismic Conference on Bridges + Highways, Charleston, South Carolina, July 27 -30, 2008.
- Mullapudi, T.R.S., Ayoub, A.S., Abdeldjelil Belarbi, "Fiber Section Formulation with Bi-Axial Strength Envelope for Analysis of Shear Dominant RC Structures" NCBC 2008, Concrete bridge conference, St Louis, MO, May 2008.
- Belarbi, A., Ayoub, A., Silva, P., Green, G., Bae, S., Shanmugam, S., and Mullapudi, R., "Seismic Performance of RC Bridge columns Subjected to Combined loading including Torsion," Structures Congress 2007-New Horizons and Better practices, ASCE, Long Beach, California, May.2007.
- Mullapudi, T.R.S., "Monotonic and Cyclic Behavior of Headed Anchors with Cracked and Un-cracked Concrete" Advances in materials and mechanics of concrete structures 2004, National workshop, IIT Madras, India, Chennai, July 2004.
- Mullapudi, T.R.S., "Seismic Behavior of RC Structures Subjected to Combined Loading including Torsion," EERI Annual Meeting – Earthquakes without Borders, La Jolla, CA, February 9-12, 2011 (EERI Graduate Student Paper Competition Award (2010)).
- Labib, M., Mullapudi, T.R.S., Moslehy, Y., and Ayoub, A.S., "Simulation of RC structures subjected to multi-directional shear," ASCE Texas Section Spring Meeting – Building on Tradition, College Station, TX, April 27-30, 2011.
- Mullapudi, T.R.S., and Ayoub, A.S., "Seismic Analysis RC Structures under Combined Loadings including Torsion," ASCE Texas Section Fall Meeting – Sustainability in the Desert Southwest, EL Paso, TX, October 6-9, 2010.
- Mullapudi, T.R.S., Howser, R, Mo, Y.L. and Ayoub, A.S., "Modeling of Carbon-Nanofiber Concrete Structures with Fiber Element," ASCE Texas Section Fall Meeting – Sustainability in the Desert Southwest, EL Paso, TX, October 6-9, 2010.
- Mullapudi, T.R.S., Gao, D., Mo, Y.L. and Ayoub, A.S., "Pulse Velocity Variation of Carbon-Nanofiber Concrete with Strain," ASCE Texas Section Fall Meeting – Sustainability in the Desert Southwest, EL Paso, TX, October 6-9, 2010.
- Mullapudi, T.R.S., Ayoub, A.S., "Nonlinear Analysis of Shear Critical Reinforce Concrete Shear Walls," ASCE Texas Section Spring Meeting – Engineering Excellence, Austin, TX, April 11- 13, 2010.

Mullapudi, T.R.S., Charkhchi, P. and Ayoub, A.S., "Nonlinear Analysis of Shear Critical Reinforce Concrete Shear Walls," ASCE Texas Section Spring Meeting – Engineering Excellence, Austin, TX, April 11- 13, 2010 (Won the Best of the Session Paper Award).

Mullapudi, T.R.S., Gao, D., Mo, Y.L. and Ayoub, A.S., "Pulse Velocity Method for Strength Detection of Carbon Nanofiber Concrete," ASCE Texas Section Spring Meeting – Engineering Excellence, Austin, TX, April 11- 13, 2010.

Mullapudi, T.R.S., "Static and Seismic Evaluation of Shear Critical Concrete Structures with Combined Loadings," ICE Student Paper Competition, New York, NY, April 20, 2010 (Selected as one of the Best Paper).

Mullapudi, T.R.S., Ayoub, A.S., "Combined Loadings and Universal Panel Tester," CIGMAT 2010, University of Houston, Houston, TX, April 23, 2010.

Mullapudi, T.R.S., Gao, D., Mo, Y.L. and Ayoub, A.S., "Stiffness Detection of Carbon-Nanofiber Concrete with NDT Method," CIGMAT 2010, University of Houston, Houston, TX, April 23, 2010.

Mullapudi, T.R.S. , Ayoub, A.S., "A 3D Finite Element Model for RC members subjected to Combined Bending and Torsion," ASCE Texas Section Fall Meeting – Constructing our Future, Houston, TX, October 26- 30, 2009.

Charkhchi, P., Mullapudi, T.R.S. and Ayoub, A.S., "Parametric Studies of Reinforce Concrete Shear Walls," ASCE Texas Section Fall Meeting – Constructing our Future, Houston, TX, October 26- 30, 2009.

Mullapudi, T.R.S., Ayoub, A.S., "Behavior of a finite beam on a two-parameter foundation subjected to dynamic loading," ASCE Texas Section Fall Meeting – Constructing our Future, Houston, TX, October 26- 30, 2009.

Mullapudi, T.R.S., Ayoub, A.S., "Nonlinear Behavior of Concrete Structures with Torsion," ASCE Texas Section Spring Meeting, South Padre Island, TX, April 01- 04, 2009.

Mullapudi, T.R.S., Ayoub, A.S., "A Finite Element Formulation for Analysis of RC Sections under Combined Loadings," ASCE Texas Section Fall Meeting, Dallas, TX, October 01- 04, 2008.

Mullapudi, T.R.S., Ayoub, A.S., "Nonlinear Analysis of Beams Resting on Two Parameter Foundation," ASCE Texas Section Fall Meeting, Dallas, TX, October 01- 04, 2008.

Mullapudi, T.R.S., "Worlds Most Slender Arch Bridge" CEA Fest 2003 Technical paper presentation, IIT Madras, India, Chennai, May 2003.

Mullapudi, T.R.S., "Mix Design using Taguchi Method of Experimentation" CEA Fest 2003, Technical paper presentation , IIT Madras, India, Chennai, May 2003.

Mullapudi, T.R.S., "High Performance Concrete mix Design" NIRMITEE 2001, Technical paper presentation , MAEER's MIT Pune, India, Pune, January 2001.

Mullapudi, T.R.S., "Management of Bio-Medical Waste" NIRMITEE 2001 Technical paper presentation, MAEER's MIT Pune, India, Pune, January 2001.

Mullapudi, T.R.S., "Low cost housing with Bamboo reinforcement" Nirman 2000, Technical symposium, NIT Nagpur, India, Nagpur, January 2000.

**Ravi Mullapudi, Ph.D.,
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Prior Experience

CTLGroup, Skokie, Illinois

Senior Engineer, Structural Engineering + Advanced Analysis, 2018

MMI Thornton Tomasetti, Houston, Texas

Principal Structural Engineer, 2010 – 2017

University of Houston, Houston, Texas

Teaching and Research Assistant, 2006 –2007

General Electric Co. (GE), Bangalore, India

Design Engineer, 2004 - 2006

University of Stuttgart, Stuttgart, Germany

DAAD Research Fellow, 2003 - 2004

Indian Institute of Technology Madras, Chennai, India

Teaching and Research Assistant, 2002 –2003

National Institute of Technology, Warangal, India

Research Assistant, 2002 –2003