

Thittarashmi Mallick

Education

- 2020–Ongoing **PhD, Structural Engineering**, Department of Civil Engineering, Indian Institute of Technology, Madras, (CGPA 9.40/10).
Title: : A non-iterative method to analyse the long-term behaviour of prestressed concrete members.
- 2017–2020 **M.S, Structural Engineering**, Department of Civil Engineering, Indian Institute of Technology, Madras, (CGPA 8.53/10).
Title: Simplified Analysis of Reinforced Concrete Deep Beams.
- 2012–2016 **B.Tech, Civil Engineering**, Parala Maharaja Engineering College, Odisha, (CGPA 8.35/10).
Title: An Experimental Study on the Effect of Filler Materials on the Properties of Bitumen.

Research Area

Computational Mechanics, Solid Mechanics, Structural Engineering, Viscoelastic Analysis, Finite Element Analysis.

Key Projects

- PhD Thesis **A non-iterative method has been developed to investigate the time-dependent behaviour of layered bodies with application to prestressed concrete girders. The prestressed concrete members are idealized as beam-column. The viscoelastic beam-column boundary value problem is solved using the one-dimensional linear viscoelastic constitutive relation for different layers and employed in MATLAB.**
The present approach is generalised enough to include any viscoelastic model represented in the integral form. The influence of various key parameters, such as the loading type, cross-section, tendon profile, bi-axial eccentricities and tendon relaxation model, on the strain, deflection, prestress loss, and axis of rotation for both bonded and unbonded prestressed concrete beams is demonstrated. The present study highlights the need to consider the reinforcement and use of an appropriate creep compliance and shrinkage strain function.
- M.S Thesis **A new methodology is proposed to arrive at the truss configuration to idealize the deep beam. A simplified methodology which is robust and computationally efficient is proposed to analyse the deep beam using the recently proposed non-linear constitutive model for concrete and employed in MATLAB. The proposed methodology predicts failure load and mode, deflection and strain in the reinforcement well and are established by comparing with the existing experimental observations.**
- B.Tech Thesis **A Laboratory study was conducted to find the penetration grade of modified bitumen . It was observed that the use of cement, lime, fly ash as filler material and other suitable chemicals increases the strength of bituminous mix in terms of Marshall Stability. The study was beneficial for improving bitumen properties without significant increase in cost factor.**

Course Projects

- May 2022 **We studied and solved the 1D boundary value problem involving linear viscoelastic model consisting of 4 Kelvin-Voigt model with one spring in series to determine the response of viscoelastic bending of simply supported beam with constant UDL, (Instructor: Prof. Murali Krishnan J and Prof. U. Saravanan).**
- Jan 2021 **Investigated how non-linear problem characteristics affect meta-model performance using NRMSE, (Instructor: Prof. Palaniappan Ramu).**
- May 2018 **We numerically modeled and studied the longitudinal shearing response of an annular cylinder made up of a material that obeys (a) Arruda Boyce model (b) Blatz-Ko model for polyurethane, (Instructor: Prof. U Saravanan).**

Course Works

- Relevant Course (PhD) **Modern Construction Materials, Optimization methods in Engineering Design, Probability Methods in Civil Engg, Mechanics of Viscoelastic Materials, Rheology of Civil Engineering Materials.**

Relevant Course (M.S) **Structural Dynamics, Prestressed Concrete Structures, Advanced Mechanics of Structures, Finite Element Analysis, Elastic and Plastic Stress Analysis, Advanced Theory and Design of Concrete Structures, Experimental Techniques Lab.**

Online courses **Online Refresher Course on “Analysis, Design and Construction Aspects of Precast Structures, Online Technical Workshop on Engineering the Span: Bridge Superstructures (Part - 1) .**

Industrial Training

2015 **Vocational training in civil department at NALCO, Feasibility analysis report on bitumen road.**

Conference/ Paper publication

2025 **Thittarashmi Mallick**, Srimankanna, Yalla., and Saravanan, U., A comparative study of modulus methods and exact solution: Application to real-life prestressed concrete box girder bridges, *ICCMS, 3-5th July 2025, IIT Tirupati.*

2024 **Thittarashmi Mallick**, and Saravanan, U., Analysis of prestressed concrete beams: A comparative study of modulus methods and exact solution, *CONCREEP, 5-7th June 2024, TU Delft, Netherlands.*

2023 **Thittarashmi Mallick**, and Saravanan, U., Time-dependent analysis of prestressed concrete bonded beam, *ICCMS, 20-22nd December 2023, IIT Gandhinagar, India.*
(Selected and accepted for publication)

2023 **Thittarashmi Mallick**, Kumar, P. and Saravanan, U., Characterization of spatially varying quantity through random field approach employing Savitzky-Golay detrending algorithm, *ICCMS, 20-22nd December 2023, IIT Gandhinagar, India.*
(Selected and accepted for publication)

2022 **Thittarashmi Mallick.** and Saravanan, U., A truss idealization for reinforced concrete beam subjected to point loads, *ESMC 2022, European Solid Mechanics Conference, 2022, Ireland.*

2019 **Thittarashmi Mallick**, and U.Saravanan., Analysis of reinforced concrete deep beams, *INCAM 2019, 3-5 July 2019, Iisc Bangalore, India.*

International journal publication

2025 **Thittarashmi Mallick**, and Saravanan, U., A non-iterative method to analyze long term behavior of prestressed concrete beams with reinforcement, *Structures* **86**, 111197. <https://doi.org/10.1016/j.istruc.2026..>

Technical Skills

Softwares C (certified course), Matlab®, Maple®, Abaqus®, MIDAS Civil®, SAP2000®, ETABS® (certified course), STAAD®, AutoCAD® (certified course), LATEX®, Inkspace

Position of Responsibility

Teaching Assistant **Introduction to research, Structural Analysis, Advanced Structural Analysis, Finite Element Analysis, Advanced Mechanics of Structure, Vector Calculus and Numerical Methods, Solid and Fluid Mechanics.**

Dec, 2024 **Organizer**, *Brainstorming Session on “Structural Health Monitoring and Assessment of Concrete Bridge Girders”*, Department of Civil Engineering, IIT Madras.

Feb, 2023 **Organizer**, *Symposium on Structural Engineering: The Way Forward*, Department of Civil Engineering, IIT Madras.

Feb, 2018 **Organizer**, *One-day workshop on “Structural Design of Building Systems”*, Department of Civil Engineering, IIT Madras.

2015 **General Secretary for the Annual Fest (ARENA 2K15)**, Parala Maharaja Engineering College, Berhampur.

Others

Hobbies: Reading, Cooking, Playing, Travelling

Linguistic: English, Hindi, Odia