

# Dr. Stefie J. Stephen

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## EDUCATION

- Ph.D in Civil Engineering  
Indian Institute of Technology Madras, Chennai, India  
Dissertation title: “Incorporation of time-dependent fracture behavior in the structural design of fibre reinforced concrete elements” Sep 2019  
Guide: Prof. Ravindra Gettu
- M. E (First Class with Distinction) in Structural Engineering  
Government College of Technology, Coimbatore, Tamil Nadu, India  
Thesis title: “Study of nonlinear seismic response of irregular RC frame by embracing various structural components” May 2013  
Guide: Dr. V. M. Shanthi
- B. E (First Class with Distinction) in Civil Engineering  
A. C. College of Engineering and Technology, Karaikudi, Tamil Nadu, India  
Thesis title: “Analysis and design of bus terminus using STAAD Pro. and MATLAB” May 2011  
Guide: Dr. Kumar

## PROFILE SUMMARY

A profile with teaching, research and service components

- Teaching
  - 5 years of teaching assistantship experience at IIT Madras.
  - Assisted several interns and M.Tech. students towards completion of their project.
- Research
  - Four SCI/Scopus indexed journal papers as first author.
  - Inventor of a copyrighted software.
  - One book chapter and five international conference papers.
  - Recipient of INAE Innovative Student Project Award 2020 for PhD thesis.
- Services
  - Maintenance of ‘Mechanical Performance and Characterization of Engineering Materials’ laboratory at IIT Madras.
  - Assisted in organizing international conference, national-level symposium and 5-day short-term course at IIT Madras.

## WORK EXPERIENCE

- Postdoctoral researcher  
Indian Institute of Technology Madras, Chennai, India July 2019-till date
- Teaching/Research Assistant  
Indian Institute of Technology Madras, Chennai, India July 2013-August 2019

## PUBLICATIONS

### A. Paper publications in SCI/Scopus indexed journal

1. **Stephen S. J.**, Gettu R., Ferreira L. E. T., and Jose S., “Assessment of the toughness of fibre reinforced concrete using the R-curve approach”, *Sādhanā*, 43–46 (2018).
2. **Stephen S. J.**, Raphael B., Gettu R., and Jose S., “Determination of the tensile constitutive relations of fibre reinforced concrete using inverse analysis”, *Construction and Building Materials*, 195, 405-414 (2019).
3. **Stephen S. J.**, and Gettu R., “Rate-dependence of the tensile behaviour of fibre reinforced concrete in the quasi-static regime”, *Materials and Structures*, 52:107 (2019).
4. **Stephen S. J.**, and Gettu R., “Fatigue fracture of fibre reinforced concrete in flexure”, *Materials and Structures*, 53:56 (2020).

### B. Paper(s) under review

5. **Stephen S. J.**, Zangelmi E. J., Gettu R., and Aguado A. Kumar S. V., “Determination of the complete stress-strain response of concrete under uniaxial compression”, submitted to *Indian Concrete Journal*.

### C. Papers under preparation

6. **Stephen S. J.**, and Gettu R., “Implications of time-dependent tensile response in the design of concrete tunnel segments with hybrid reinforcement”.
7. Prajapati R., **Stephen S. J.**, and Gettu R., “Mechanical characterisation of thermo-mechanically beneficiated recycled coarse aggregate concrete”.
8. **Stephen S. J.**, Murugan K., and Gettu R., “Effect of geometry on the fracture performance of hooked-ended steel fibre reinforced concrete”.

### D. Book chapter

1. **Stephen S. J.**, and Gettu R., "Relación constitutiva en tracción y diseño estructural" (Constitutive Relation in Tension and Structural Design), Chapter 7, *Hormigón Reforzado con Fibras*, Ed. Zerbino R., Asociación Argentina de Tecnología del Hormigón, Buenos Aires, ISBN 978-987-47035-1-4, pp. 127-144 (2020).

### E. International conference proceedings (\* indicates presenter)

1. Jose S.\*, **Stephen S. J.**, and Gettu R., “Study of the post-cracking behaviour of steel and polymer fibre reinforced concretes”, *Proc. 2<sup>nd</sup> R. N. Raikar Memorial International Conference on Advances in Science and Technology of Concrete* (Mumbai, India), 258p. (2015)
2. **Stephen S. J.**\*, Raphael B., and Gettu R., “Obtaining fracture properties of FRC by inverse analysis using the PGS optimization algorithm”, *Proc. 6<sup>th</sup> International Congress on*

*Computational Mechanics and Simulation*, ICCMS2016 (Mumbai, India), Eds. S. Pendhari, P. Nanthagopalan, V. Deshmukh, A. Bambole and Y. Desai, [http://www.iccms2016.org/Docs/ICCMS\\_Proceeding.pdf](http://www.iccms2016.org/Docs/ICCMS_Proceeding.pdf), 480 p. (2016)

3. **Stephen S. J.**, Gettu R.\*, and Raphael B., “Effect of loading rate on the fracture behaviour of fibre reinforced concrete”, *Proc. 9<sup>th</sup> International Conference on Fracture Mechanics of Concrete and Concrete Structures*, FraMCoS-9 (Berkeley, USA), Eds. V. Saouma, J. Bolander and E. Landis, <http://framcos.org/FraMCoS-9/Full-Papers/71.pdf>, DOI 10.21012/FC9.071, 6 p. (2016)
4. Murugan K.\*, **Stephen S. J.**, and Gettu R., “Influence of fibre geometry on the fracture of steel fibre reinforced concrete”, *IOP Conference Series: Materials Science and Engineering*, 936 (2020)
5. **Stephen S. J.**, and Gettu R., “Incorporation of rate-dependent fracture properties in the design of precast concrete tunnel segment with hybrid reinforcement”, Chapter 68, *Fibre Reinforced Concrete: Improvements and Innovations*, Eds. Serna P., Llano-Torre A., Marti Vargas J. R., Navarro-Gregori J., RILEM Bookseries 30 (2020)

#### **F. Conference presentations** (\* indicates presenter)

1. **Stephen S. J.\***, Jose S., and Gettu R., “Benefits of hybrid combinations of amorphous metallic and steel fibres in structural applications” the ACI Open Topic Session at the *ACI Convention and Exposition in Las Vegas, NV, USA*, 14 – 18<sup>th</sup> October, 2018 (Oral Presentation)
2. **Stephen S. J.**, and Gettu R.\*, “Fatigue response of cracked fibre reinforced concrete” the 73rd RILEM Week 2019-*International Conference on Innovative Materials for Sustainable Civil Engineering in Nanjing, China*, 26 – 30<sup>th</sup> August, 2019 (Oral Presentation)
3. **Stephen S. J.\***, Nayar S. K., and Gettu R., “Incorporation of fatigue criteria in the design of fibre reinforced concrete pavements” the 74th RILEM Week & 40th Cement and Concrete Science Conference in Sheffield, United Kingdom, 31 August – 4 September, 2020 (Oral and Poster Presentation)

### **INVITED TALKS AND GUEST LECTURES**

- “Fibre reinforced concrete: Principles and Applications”, an online session in the week-long course for civil engineers at Coal India Ltd. on 5 November 2020
- “Introduction to fibre reinforced concrete”, a guest lecture for Concrete Pavement Technology course offered for M.Tech students at IIT Madras on 10 November 2020.
- “Advanced Mechanical Characterisation Techniques for Building Materials”, a keynote speaker in an online technical session of AICTE sponsored STTP course held at K. S. Rangasamy College of Technology, Tiruchengode, Tamil Nadu on 25 November 2020.

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- ‘*sigw-Concrete*’, Software for obtaining tensile constitutive model of quasi-brittle material using inverse analysis of experimental data from three-point bending tests of notched beams, copyright **registered** in India (ROC No.: SW-13538/2020), Inventors: **S. J. Stephen**, R. Gettu and B. Raphael.

## AWARDS AND SCHOLASTIC ACHIEVEMENTS

- Recipient of the most prestigious Indian National Academy of Engineers (INAE) **Innovative Student Projects Award 2020** under Doctoral level — for the extensive and innovative experimental, analytical and numerical investigations accomplished during the doctoral research (PhD) at IIT Madras.
- University rank holder - **20<sup>th</sup> rank** in B.E Anna University of Technology, Trichy, Tamil Nadu, India
- Paper Presentation:
  - Presented a paper on “**Microclimate in Building Design**” and won **first prize** in a National level technical symposium held on 30<sup>th</sup> September 2009 at R.V.S College of Engineering & Technology, Dindigul, Tamil Nadu, India.
  - Presented a paper on “**Bacterial Concrete**” and won **second prize** in a State level technical symposium held on 9<sup>th</sup> October 2009 at Government College of Engineering, Tirunelveli, Tamil Nadu, India.
  - Presented a paper on “**Trenchless Technology**” and won **second prize** in departmental seminar held on 8<sup>th</sup> February 2009 by Civil Engineering Association, A. C. College of Engineering and Technology, Karaikudi, Tamil Nadu, India.
- Participated in **technical quiz** and won **second prize** in a State level technical symposium held on 9<sup>th</sup> October 2009 at Government College of Engineering, Tirunelveli, Tamil Nadu, India.

## TEACHING AND RESEARCH EXPERIENCE

As a teaching assistant during postgraduation period

- Basic Structural Design II - concrete (1 batch)
- Computer Application Laboratory (1 batch)

As a teaching assistant during doctoral tenure

- Modern Construction Materials (2 batches)
- NPTEL online course on ‘Modern Construction Materials’ (2 batches)
- Concrete Technology (1 batch)
- Building Material and Construction (1 batch)
- Construction Material Laboratory (1 batch)
- Assisted one undergraduate student (international student from Nagaoka University of Technology, Japan) towards the completion of project – fabrication and testing of concrete beams under fatigue loading and helped him with report preparation.
- Assisted three masters’ projects:
  - Stress-strain characteristics of high strength concrete (Oct 2015) and Stress-strain characteristics of plain and fibre reinforced high strength concrete under uniaxial loading (May 2017) – demonstrated the testing procedure in closed-loop system and helped with the thesis preparation
  - Modelling of steel fibre reinforced concrete tunnel lining segment (May 2018) – demonstrated the numerical modelling in TNO DIANA and helped with the thesis preparation.

As a research scholar at IIT Madras

- Assisted in laying of FRC floor slab (Mist room, Department of Civil Engineering, IIT Madras)
- Developed expertise in operating servo hydraulic closed-loop control system
- Performed extensive monotonic and fatigue testing on plain and fibre reinforced concrete beams, slabs and cylinders using advanced closed loop control system
- Extensively used advanced instrumentation gadgets such as clip gauge, circumferential extensometer, axial extensometer and LVDT
- Performed finite element analysis of FRC beams and tunnel segments under different loading conditions using TNO DIANA

## PARTICIPATION IN RESEARCH PROJECTS

Project title	Responsibilities
➤ Energy absorption capacity tests performed on polymer fibre reinforced shotcrete panels in relation to <b>Leighton tunnelling project</b>	➤ Testing of shotcrete panels, analysis of result and report preparation
➤ Energy absorption capacity tests performed on synthetic fibre reinforced shotcrete panels in relation to <b>Chenani Nashri tunnel project</b>	➤ Testing of shotcrete panels, analysis of result and report preparation
➤ Design of top layer of <b>slabs</b> for Apollo tyres plant, Chennai	➤ Design of elevated slabs and report preparation
➤ Characterization of fracture behavior of limestone calcined clay cement ( <b>LC3</b> ) concrete	➤ Casting and testing of LC3 concrete to obtain complete stress-strain behavior
➤ Flexural toughness characterization of steel fibre reinforced concrete in relation to the <b>tunnel t-48</b> of Udhampur-Srinagar-Baramulla railway line project	➤ Testing of beams, analysis of result and report preparation
➤ <b>Environmental assessment</b> pertaining to the proposed demolition of high-rise buildings in the CRZ of Maradu municipality, Kerala	➤ Collection of data, analysis and report preparation
➤ A new framework of high value added zero-waste <b>recycling of concrete</b> from construction and demolition waste – <b>UKIERI-DST project</b>	➤ Casting, testing of recycled aggregate concrete, analytical and numerical simulations
➤ Flexural and compressive properties of concrete extracted from steel fibre reinforced shotcrete panels from <b>Rewa Sidhi Tunnel Project</b>	➤ Testing of samples extracted from shotcrete panels, analysis of result and report preparation

## SUMMER SCHOOL, TRAINING & INTERNSHIP

- Participated in the **Dresden International Summer School, Germany** on High Performance Fibre-Reinforced Cement-based Composites for Future Infrastructure, July, 2015.
- In-plant training at **Consolidated Construction Consortium Ltd., Chennai**
- Internship on the topic “Seismic Vulnerability of RC Buildings” in Civil Engineering Department (Structural Engineering Division) at **IIT Madras, Chennai** for one month.

## TRAVEL GRANT AND FELLOWSHIP

- IIT Madras Alumni travel grant for Dresden International Summer School in Germany, 2015.
- Institute travel grant for ACI Convention and Exposition in Las Vegas, USA, 2018.
- MHRD, Government of India fellowship to pursue Ph.D. at IIT Madras, 2013-2018.
- AICTE scholarship to pursue M.E. at Government College of Technology, Coimbatore, 2011-2013.

## PROFESSIONAL AND ACADEMIC SERVICES

- Membership of professional bodies
  - Honorary 5-year student member of Indian National Academy of Engineers (INAE)
  - Affiliate Member of RILEM, International Union of Laboratories and Experts in Construction Materials, Systems and Structures #36456
  - Young Annual Member, Tunnelling Association of India # 0067/TAIYM/AM/2020.
  - Life Member, Indian Concrete Institute #11312
  - Life Member, Society for Failure Analysis
  - Safety committee member in Department of Civil Engineering at IIT Madras (in the year 2016)
- In charge of maintenance of ‘Mechanical Performance and Characterization of Engineering Materials’ laboratory (2015 and 2016)
  - Helped in the procurement of DAQ system
  - Designed and helped in the fabrication of the calibrator and the beam testing setup
  - Developed template for monotonic and fatigue testing of beams and cylinders
  - Helped in troubleshooting various problems that arose in the MTS closed-loop testing system
- Coordinator for different programs at IIT Madras
  - AICTE sponsored 5-day course on Advanced Concrete Technology 2015–registration and logistics
  - Concrete challenge event during CEA fest 2016–evaluating teams
  - National concrete canoe competition 2016–registration
  - International Conference on Advances in Construction Materials and Systems 2017 and RILEM week–registration and logistics
  - 5<sup>th</sup> Concrete Research in India Symposium 2019–overall coordinator.

## RESEARCH INTERESTS

- Design of tunnel lining segments
- Fracture mechanics of high-performance and sustainable concrete systems
- Fatigue characterization of concrete
- Creep and shrinkage behavior of high-performance concrete systems
- Numerical and analytical modelling of concrete structures

## SOFTWARE SKILLS

Programming languages : Beginner in C and MATLAB

Software Packages : TNO DIANA, SeismoStruct, AUTOCAD, ArchiCAD and STAAD Pro.

## PERSONAL PROFILE

Date of Birth : 17/03/1990  
Sex : Female  
Marital Status : Married  
Nationality : Indian  
Languages : English, Tamil

## References

- Prof. Ravindra Gettu  
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