

Scientist, BTCM Division
Department of Civil Engineering
Indian Institute of Technology Madras
Chennai, 600036, India
Email: sunithasanthoshnair@gmail.com
Phone: +91 96001 52118

Dr. Sunitha K. Nayar

EDUCATION

- **Ph. D. in Civil Engineering** **April 2016**
Indian Institute of Technology Madras, Chennai, India
Dissertation Title: “Design of fibre reinforced concrete slabs-on-grade and pavements”
Guide: Prof. Ravindra Gettu
- **M. Tech. (with Distinction) in Structural Engineering** **May 2004**
National Institute of Technology Calicut, Kerala, India
Thesis Title: “Optimization of mix design using Artificial Neural Networks”.
Guide: Prof. A.P. Sashikala
- **B. Tech. (Honors) in Civil Engineering** **March 1998**
N. S. S. Engineering College Palakkad, Calicut University, Kerala, India

PROFILE SUMMARY

A rounded profile with teaching, research and service components

- Teaching
 - 9 years of UG teaching experience at Amrita Vishwa Vidyapeetham Univ., Coimbatore (with a teaching performance rating of more than 80% in all the courses taught)
 - Member, UG Board of Studies, at Amrita Vishwa Vidyapeetham Univ., Coimbatore
- Research
 - Principal investigator of one sponsored project on concrete technology from DST, Govt. of India (ongoing at IIT Madras)
 - Doctoral research experience at IIT Madras
 - 4 refereed journal papers, 13 refereed conference papers, one book chapter, Edited 4 Volumes of Conference Proceedings
- Services
 - Peer reviewer for three journals
 - Member of two technical committees of Indian Concrete Institute
 - Assisted in organizing two international conferences at IIT Madras
 - General administrative/accreditation activities during the teaching career at Amrita

WORK EXPERIENCE

- **Women Scientist – WOS-A** (since August 2015)
Indian Institute of Technology Madras, Chennai, India
- **Doctoral Research Scholar** (July 2009-July 2015)
Indian Institute of Technology Madras, Chennai, India
- **Assistant Professor (SG)** (July 2008-July 2009)
Amrita School of Engineering, Amrita Vishwa Vidyapeetham Univ., Coimbatore, India
- **Assistant Professor** (July 2007-July 2008)
Amrita School of Engineering, Amrita Vishwa Vidyapeetham Univ., Coimbatore, India
- **Senior Lecturer** (July 2004-July 2007)
Amrita Institute of Technology, Coimbatore. India
- **Lecturer** (January 1999-July 2002)
Amrita Institute of Technology and Science, Coimbatore. India
- **Industry Experience as Engineer** (March 1998 – December 1998)
Thomas Panicker and Associates, Architects, Trivandrum, India

AWARDS AND GRANTS

- Indian National Academy of Engineers (INAE) Innovative Student Projects Award 2016
- Indian Concrete Institute (ICI) (Chennai Centre) – UltraTech Award – 2016 for Outstanding Thesis in the field of Concrete in Tamil Nadu (Category – Doctoral)
- Best Poster Award at the 3rd Conference of Transportation Research Group of India, CTRG 2015, held at Kolkata, India
- Research grant from Department of Science and Technology (DST) under the Women Scientist Scheme (WOS-A) for a period of three years starting from August 2015.
- Best Paper Award at the Fourth CUSAT National Conference RACE 2010 held at Kochi, India.

PUBLICATIONS

- **Journal articles**
 4. **Nayar, S. K., and Gettu, R.,** (2017) Design Methodology for Fibre Reinforced Concrete Slabs-on-grade Based on Inelastic Analysis, *Indian Concrete Journal*, Vol. 91, No. 3, pp 26-36
 3. **Nayar, S. K and Gettu, R.,** (2016) Benefits of Using Amorphous Metallic Fibres in Concrete Slabs-on-grade, *RILEM Technical Letters*, [S. l.], Vol. 1, Dec. 2016, pp. 122-128. ISSN 2518-0231. Available at:

<<https://letters.rilem.net/index.php/rilem/article/view/20/26>>. Date accessed: 08 mar. 2017. doi:<http://dx.doi.org/10.21809/rilemtechlett.2016.20>.

2. **Nayar, S. K., and Gettu, R.**, (2015), Synergy in Toughness by Incorporating Amorphous Metal and Steel Fibres, *ACI Materials Journal*, Vol. 112, No. 6, pp 821-827.
1. **Nayar, S. K., Gettu, R., and Krishnan, S.**, (2014), Characterisation of the Toughness of Fibre Reinforced Concrete - Revisited in the Indian Context, *Indian Concrete Journal*, Vol. 88, No. 2, pp 8–23.

- **Book chapter**

1. **Nayar, S. K., and Gettu, R.**, (2016), A Comprehensive Methodology for Design of Fibre Reinforced Concrete Pavements, *fib Bulletin 79*, Fibre-reinforced concrete: From design to structural applications, pp 321-330.

- **Books edited**

1. **Santhanam, M., Gettu, R., Pillai, R. G., and Nayar, S. K.**, (2017), Advances in Construction Materials and Systems Vol. 1-4 (Proc. of International Conference ICACMS 2017), RILEM Publications S.A.R.L., Bagnueux, France, (2008)
ISBN: 978-2-35158-190-2 SET
e-ISBN: 978-2-35158-191-9 (online version)
ISBN:978-2-35158-193-3 Vol. 1 Keynotes, 192 p.
ISBN: 978-2-35158-194-0 Vol. 2 Concrete, 662 p.
ISBN:978-2-35158-195-7 Vol. 3 Concrete suite, 644 p.
ISBN:978-2-35158-196-4Vol. 4 Others, 744 p.

- **Peer reviewed international conference articles** (*Name indicates the presenter)

6. ***Nayar, S. K., and Gettu, R.**, (2016), Assessment of a Design Methodology for FRC Slabs-on-grade, *Proceedings of BEFIB 2016, Ninth RILEM International Conference on Fibre Reinforced Concrete*, Vancouver. Canada, pp 1369-1384
5. ***Gettu, R., and Nayar, S. K.**, (2015), A Design Methodology for Fibre Reinforced Concrete Slabs-on-grade, *Proceedings of 27th Biennial National Conference of the Concrete Institute of Australia in conjunction with the 69th RILEM Week conference (Concrete 2015)*, Australia, pp 443-452.
4. ***Nayar, S. K and Gettu, R.**, (2014), A Design Methodology for Fibre Reinforced Concrete Pavements and Slabs-on-grade, *Proceedings of 10th fib International Ph. D symposium*, Quebec, Canada, pp 51-56.
3. ***Nayar, S. K and Gettu, R.**, (2014), A Comprehensive Methodology for the Design of Fibre Reinforced Concrete Pavements, *Proceedings of Joint ACI-fib International*

workshop on FRC: From design to structural applications, FRC 2014, Montreal, Canada, pp 453-464.

- 2 **Nayar, S. K., and *Gettu, R.,** (2012), On the Design of Steel Fibre Reinforced Concrete Pavements and Slabs-on-grade, *Proceedings of BEFIB 2012, Eighth RILEM International Conference on Fibre Reinforced Concrete,*, Guimarães, Portugal, 11 p.
- 1 **D’costa, G., *Nayar, S. K., and Gettu, R.,** (2011), Sustainability Assessment of Steel Fibre Reinforced Concrete Pavements, *Proceedings of the International conference on Structural engineering, Construction and Management, ICSECM 2011,* Kandy, Sri Lanka, 15 p.

- **Peer reviewed national conference articles**

7. ***Nayar, S. K., and Gettu, R.,** (2015), A Methodology for Designing Fibre Reinforced Concrete Pavements, *Proceedings of 3rd Conference of Transportation Research Group of India, CTRG 2015,* December 2015, **Awarded the Best Poster in the conference poster presentation section.**
- 6 **Nayar, S. K., and *Gettu, R.,** (2015), Performance of Concrete Reinforced with Combinations of Amorphous Metallic and Conventional Steel Fibres, *Proceedings of 4th Asian conference on Ecstasy in concrete, ICI-ACECON 2015,* October 2015, pp 21-28.
- 5 ***Nayar, S. K., and Gettu, R.,** (2012), On the Design of Fibre Reinforced Concrete Slabs-on-Grade and Pavements, *Proceedings of the Conference on Fibre Reinforced Concrete – Global Developments, FIBCON 2012,* Nagpur, February, pp 85-92.
- 4 **Nayar, S. K., and *Gettu, R.,** (2012), Characterization of Fibre Reinforced Concrete, *Proceedings of the Conference on Fibre Reinforced Concrete – Global Developments, FIBCON 2012,* Nagpur, pp 30-47.
- 3 ***Nayar, S. K., and Gettu, R.,** (2011), On the Toughness-Based Design of Steel Fibre Reinforced Concrete Pavements, *Proceedings of 1st Conference of the transportation research group of India, CTRG,* Bangalore, India, 12 p.
- 2 **Nayar, S. K., D’costa, G., and *Gettu, R.,** Special concretes for Pavement Construction, *National Workshop on Sustainable pavements: Practices, Challenges and Direction,* October 2010, IIT Madras.
- 1 ***Nayar, S.K., Gettu, R., Aravind, T., Ajox, F. H., and Satheesh, B.,** Flexural Toughness Testing of Steel Fibre Reinforced Concrete, *Proceedings of Fourth CUSAT National Conference RACE 2010,* India, pp 105-110. **Awarded the best paper in the Structural Engineering section of the conference.**

- **Technical Committee Recommendations (as a committee member)**

- **ICI-TC/01.1,** Test Methods for the Flexural Strength and Toughness Parameters of Fiber Reinforced Concrete, ICI Technical Committee Recommendation, Indian Concrete Institute Journal, Vol. 15, No. 2, 2014, pp 39–43. – **The test configuration, test procedure and reporting methods described in the guidelines are based on the characterization program done as part of my Ph.D dissertation.**
- **ICI-TC/01.2,** Specifications for Reference Concretes to be Used for Evaluating Fibres for Concrete Reinforcement, ICI Technical Committee Recommendation.

- **ICI-TC/01.3**, Definitions, Specifications and Conformity Requirements for Steel Fibres to be Used as Concrete Reinforcement, ICI Technical Committee Recommendation.
- **ICI-TC/01.4**, Definitions, Specifications and Conformity Requirements for Polymeric Fibres to be Used as Concrete Reinforcement, ICI Technical Committee Recommendation.

INVITED TALKS

- “Special Concretes and Application” and “Use of FRC in Pavement Application” at the 2-Day Seminar on Latest Innovations in Concrete, conducted by ICI Goa Chapter at Madgaon, Goa on 5-6 February 2016.
- “How to control cracking in concrete systems?” at the national Conference in Innovations and Sustainability in Civil Engineering and Technology, ISCET 2016 at E. S. Engineering College, Villupuram on 24th March 2016.
- “Improving resistance to cracking of concrete”, at the National workshop ICCDR’16 at B S Abdur Rahman University, Chennai on 20th April 2016.
- “Characteristics of a Special Concrete” at Sri Sivasubramaniya Nadar College of Engineering, Chennai on 25th July 2016.
- “Upcoming flooring guideline ICI TC/09”, at the Technology Conference on Industrial & Commercial Flooring held on 27-28 September 2016 at Chennai Trade Centre.
- “Concrete Past, Present and Way forward”, at the Concrete cube testing competition at Vel’s University, Chennai on 08th March 2017.
- “Upcoming flooring guideline ICI TC/09”, at the Technology Conference on Industrial & Commercial Flooring held on 12-13 September 2017 at Mumbai.

RESEARCH EXPERIENCE

- **As Women Scientist**
 - Title of project: Development, Characterization and Prototype Application of High Performance Fibre Reinforced Concrete
 - Funding amount: Rs. 17,92,000/-
 - Funding agency: Department of Science and Technology, Govt. of India
 - Duration of Project: 3 years
 - Mentor: Prof. Ravindra Gettu
 - Affiliated organization: IIT Madras
 - Role: Principal Investigator
 - Prepared the proposal, presented and defended the proposal at the assessment committee meeting
 - Maintaining accounts of the project amount
 - Assisted in design consultancy for leading clients such as Owens Corning, Bekaert Industries, TARA etc.
 - Preparing and submitting proposal to various funding agencies such as DST and MoRTH
 - Coordinating project group working under sponsored consultancy projects including report preparation and interaction with clients.
- **As part of Ph.D. dissertation**
 - Had exposure to actual laying of FRC slabs-on-grade and pavements.
 - Assisted in designing and laying about 1 km of FRC pavements on IIT Madras campus

- Performed extensive testing of FRC for flexural toughness characterization using various fibres available in Indian and international market incorporated in typical grades of concrete used in India. Tests were done on advanced testing systems having feed-back loop control.
- Performed microstructural characterization such as X –ray diffraction and X-ray Tomography.
- Extensively used advanced instrumentation gadgets such as LVDT, Clip-gauge, Resistant Thermometer Detector.
- Published journal papers, attended and presented at various national and international conferences
- **International Visits**
 - Attended and presented paper at Vancouver, Canada during September 2016 at the Ninth RILEM International Conference on Fibre Reinforced Concrete, BEFIB 2016.
 - Visited Politecnico de Milano during September-November 2014 for a period of one week as the student member under the Indo-Italian collaborative project titled “Study of Self-Healing Ability of Advanced Fibre Reinforced Cement Based Materials” within the Executive Program of Scientific and Technological Cooperation between Italian Republic and Republic of India
 - Attended and presented paper at Montreal Canada during July 2014 at the Joint ACI-fib International workshop on FRC: From design to structural applications, FRC 2014.
 - Attended and presented paper at Quebec, Canada during July 2014 at the 10th fib International Ph. D symposium.
 - Attended and presented paper at Kandy, Sri Lanka during December 2011 at the International conference on Structural engineering, Construction and Management, ICSECM 2011.

RESEARCH INTERESTS

- Physical and mechanical characterization of construction materials and systems
- Deterioration mechanisms in construction materials and systems
- Characterization of special concretes
- Modeling mechanical performance parameters for construction materials and systems
- Fatigue characteristics of concrete
- Design of fiber reinforced concrete structures
- Long term performance of high performance concrete systems

TEACHING EXPERIENCE

- **Undergraduate courses taught and number of batches**
 - Engineering Mechanics – 14 batches of students across various branches
 - Strength of Materials – 3 batches
 - Engineering Drawing – 8 batches
 - Fluid Mechanics – 2 batches
 - Environmental Engineering – 1 batch
 - Dynamics – 1 batch
 - Basic Civil Engineering – 4 batches

- Actively participated as a UG Board of Studies member when Civil Engineering Department was started at Amrita Vishwa Vidyapeetham during 2008-2009.
- Had initiated the setting up of Geotechnical laboratory in Amrita University during 2008-2009.
- Actively involved in the preparation of B. Tech curriculum when Amrita Vishwa Vidyapeetham University was being formed during 2002.
- Had a key role in upgrading the Strength of Materials laboratory at Amrita during 2000-2001.
- Had served as the faculty counselor for about 5 batches of students.
- Had been actively involved in all administrative activity at the Department level during the AICTE and NBA accreditation of Amrita University.
- Had mentored many undergraduate students and conducted several remedial classes for all subjects to improve the performance of weak students.
- Had served as the faculty advisor to the arts club at Amrita University

PROFESSIONAL AND ACADEMIC SERVICES

- **Membership of Professional Bodies**
 - Affiliate Member of RILEM, International Union of Laboratories and Experts in Construction Materials, Systems and Structures
 - Life Member, Indian Concrete Institute
 - Life Member, India Society for Technical Education
- **Member of Technical Committees – 2**
 - ICI TC/01 - Technical Committee on Fibre Reinforced Concrete
 - Actively took part in drafting the document IC TC/01.1, Test Methods for the Flexural Strength and Toughness Parameters of Fiber Reinforced Concrete
 - Given inputs for the procedure, calculation and reporting for the same document based on the characterization program and the pre-normative developed based on Ph. D. dissertation work.
 - ICI TC/09 - Technical Committee of Flooring
 - Active in drafting of various chapters pertaining to design in the TC documents.
 - Assisting the TC chairman in organizing the periodic TC meetings.
- **Peer Reviewer for Journals**
 - RILEM Journal of Materials and Structures, Springer
 - Indian Concrete Institute Journal
 - International Journal of Concrete Structures and Materials, Springer

PERSONAL PROFILE

Date of birth: 23/12/1975

Sex: Female

Marital status: Married

Nationality: Indian

Languages: English, Hindi, Malayalam, Tamil

REFERENCES

- **Prof. Ravindra Gettu**
Professor
Department of Civil Engineering,
Indian Institute of Technology, Madras
Chennai, India 600036
Email: gettu@iitm.ac.in
- **Prof. Manu Santhanam**
Professor
Department of Civil Engineering,
Indian Institute of Technology, Madras
Chennai, India 600036
Email: manusanthanam@gmail.com
- **Dr. Radhakrishna G Pillai**
Assistant Professor
Department of Civil Engineering,
Indian Institute of Technology, Madras
Chennai, India 600036
Email: pillai@iitm.ac.in