

Brief Profile

Shailendra Kumar

(Ph.D. IIT Kharagpur)

Professor in Department of Civil Engineering, School of Engineering & Technology

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Research Interests/Expertise: Fracture Mechanics of Concrete, Soft Computing Applications to R.C. Structures, Fiber-reinforced Concrete, Alternate Construction Materials.

Educational Qualifications

- Ph.D. in Structural (Civil) Engineering from Indian Institute of Technology, Kharagpur, W.B. – 721 302, India.
- M.E. in Structural (Civil) Engineering with 81.70% of marks from National Institute of Technology, Rourkela, Orissa – 769 008, India.
- B.Sc. (Engg.) in Civil Engineering with 75.81% of marks from National Institute of Technology, Jamshedpur, Jharkhand – 831 014.
- Intermediate of Science (Math) with 71.89% of marks from B.I.E.C., Patna, Bihar, India.
- 10th (Matric) Board with 66.89% of marks from B.S.E.B., Patna, Bihar, India.

Distinctions Achieved

- Invited as Member-cum-Secretary in the proposal for a new International Union of Laboratories and Experts in Construction Materials, System and Structures (RILEM) Technical Committee (created in 2011) TC TDK for “Testing methods for determination of double-K criterion for crack propagation in concrete”. Attended the invited meeting as member cum secretary in RILEM meet of Technical Committee (TCTDK) in April 2013 at Hangzhou, China.
- Have been offered Faculty Position in the School of Infrastructure at Indian Institute of Technology (IIT) Bhubaneswar in 2011.
- Ph.D. work was nominated for Innovative Students Project Award – 2010 by Indian National Academy of Engineering (INAE).
- Received Indian National Group of the IABSE medal award for the best paper entitled “Shear Strength of Reinforced Fibrous Concrete Beams Without Web Reinforcement” published in journal the Bridge and Structural Engineer, 2000, 30(3), 17-29.

Research Publications

- International Journal: **29**
- National Journals: **09**
- International/National Conferences/Seminars: **29**

Book Authored: 02

1. Kumar S. and Barai S.V. (2011). Concrete Fracture Models and Applications. ISBN 9783642167638 (Hard Cover), *Springer*.
2. S.R. Pandey and Kumar S. (2019). Simplified Testing Methods of Double-K Concrete Fracture Model. ISBN 978-613-9-44401-4, Lambert Academic Publishing.

Special Lab Established: Servo Control Closed Loop Fracture and Fatigue Testing Machine (50 T) at Civil Engineering Department, I.T., GGV in session 2012-13.

Research Guidance

Masters Level: 03

Doctoral Level: 02

Research Projects: 02

Testing & Consultancy Undertaken: 50 (including work done at my previous organization, NIT Jamshedpur from 27.03.1998 to 28.11.2011).

Major Research Projects

- UGC Major Project, at Civil Engineering , I.T., Guru Ghasidas Vishwavidyalaya (a Central University), Bilaspur, entitled “Size-effect and characterization of fracture parameters for crack propagation in concrete” grant sanctioned/released for Rs. 13.86 Lakhs in 2013 for three years. P.I. – Prof. Shailendra Kumar and Co-PI: Mr.R.K.Choubey & Dr.M.Chakradhara Rao.
- Ongoing MHRD (Department of Higher Education) collaborative project at Civil Engineering Department, Indian Institute of Technology, Kharagpur, entitled “Sustainable and cost effective housing using recycled aggregate based concrete” for the grant of Rs.5012000/- (granted in 2014) for four years. PI - Prof. Sudhir Kumar Barai, Department of Civil Engineering, IIT Kharagpur and Co-PI – Prof. Shailendra Kumar

Research Publications

International Journal

1. Pradhan Subhasis, Tiwari B.R., Kumar Shailendra and Barai S.V. (2019). Comparative LCA of recycled and natural aggregate concrete using Particle Packing Method and conventional method of design mix. *Journal of Cleaner Production* 228, 679-691.
2. Pradhan Subhasis, Kumar Shailendra and Barai S.V. (2019). Impact of particle packing mix design method on fracture properties of natural and recycled aggregate concrete. *Fatigue and Fracture of Engineering Materials and Structures* 42 (4), 943-958.
3. Pradhan Subhasis, Kumar Shailendra and Barai S.V. (2018). Shear performance of recycled aggregate concrete beams: an insight for design aspects. *Construction and Building Materials* 178: 593-611.
4. Pradhan Subhasis, Kumar Shailendra and Barai S.V. (2018). Performance of reinforced recycled aggregate concrete beam in flexure: experimental and critical comparative analysis. *Materials and Structures* 51(58):1-17
5. Choubey R.K. and Kumar S. (2018). Simplified Equations for Determining Double-K Fracture Parameters of Concrete for Three Point Bending Test. *Fatigue and Fracture of Engineering Materials and Structures* 41:1615-1626.
6. Pradhan Subhasis, Kumar Shailendra and Barai S.V. (2017). Recycled aggregate concrete: Particle Packing Method (PPM) of mix design approach. *Construction and Building Materials* 152: 269-284.
7. Choubey R.K., Kumar S. and Rao M.C. (2017). Numerical evaluation of simplified extreme peak load method for determining the double - K fracture parameters of concrete. *International Journal of Engineering and Technology* 9 (3): 2097 – 2110.
8. Dubey G. and Kumar S. (2016). Improvement in the numerical method for integrating weight function of pre-cracked specimen. *Engineering Fracture Mechanics* 154:83-91.
9. Choubey R.K., Kumar S. and Rao M.C. (2016). Modeling of fracture parameters for crack propagation in recycled aggregate concrete, *Construction and Building Materials*, 106: 168-178.
10. Pandey SR, Kumar S, Srivastava AKL (2016) Determination of double-K fracture parameters of concrete using split-tension cube test: A Revised procedure. *International Journal of Concrete Structures and Materials* 10(2): 163-173.
11. Dubey G. and Kumar S. (2015). Efficient methods for integrating weight function: a comparative analysis. *Structural Engineering and Mechanics*, 55 (4): 885-900.
12. Kumar S. and Choubey R.K. (2015). Further observations on the three-parameter R-curve of concrete-like quasi-brittle materials. *Construction and Building Materials*, 93: 857–868.
13. Choubey R.K., Kumar S. and Rao M.C. (2014). Effect of shear-span/depth ratio on cohesive crack and double-K fracture parameters. *Advances in Concrete Construction* 2 (3): 229-247.
14. Kumar S., Pandey S.R. and Srivastava A.K.L. (2014). Determination of double-K fracture parameters of concrete using peak load method. *Engineering Fracture Mechanics* 131:471-484.
15. Kumar S., Pandey S.R. and Srivastava A.K.L. (2013). Analytical methods for determination of double-K fracture parameters of concrete. *Advances in Concrete Construction* 1(4): 319-340.

16. Kumar S. and Barai S.V. (2012). Predicting the Flexural Strength of Steel Fiber Reinforced Concrete Beams using Artificial Neural Networks. *Journal of Engineering Science & Management Education*, Bhopal, India 5(IV): 639-647.
17. Kumar S. and Barai S.V. (2012). Effect of loading condition, specimen geometry, size-effect and softening function on double- K fracture parameters of concrete. *Sadhana-Academy Proceedings in Engineering Science* 37 (Part 1): 3–15.
18. Kumar S. and Pandey S.R. (2012). Determination of Double- K fracture parameters of concrete using split-tension cube test. *Computers and Concrete An International Journal* 9(2): 81-97
19. Kumar S. and Barai S.V. (2012). Size-effect of fracture parameters in concrete: a comparative study. *Computers and Concrete An International Journal* 9(1): 1-19.
20. Kumar S. and Barai S.V. (2010). Determining the Double- K fracture parameters for three-point bending notched concrete beams using weight function. *Fatigue and Fracture of Engineering Materials and Structures* 33(10): 645-660.
21. Kumar S. and Barai S.V. (2010). Size-effect prediction from the double- K fracture model for notched concrete beam. *International Journal of Damage Mechanics* 9: 473-497.
22. Kumar S. and Barai S.V. (2010). Neural networks modeling of shear strength of SFRC corbels without stirrups. *Applied Soft Computing Journal* 10: 135-148.
23. Kumar S. and Barai S.V. (2009). Effect of softening function on the cohesive crack fracture parameters of concrete CT specimen. *Sadhana-Academy Proceedings in Engineering Science* 36(6): 987-1015.
24. Kumar S. and Barai S.V. (2009). Influence of loading condition and size-effect on the K_R -curve based on the cohesive stress in concrete. *International Journal of Fracture* 156:103-110.
25. Kumar S. and Barai S.V. (2009). Equivalence between stress intensity factor and energy approach based fracture parameters of concrete. *Engineering Fracture Mechanics* 76: 1357-1372.
26. Kumar S. and Barai S.V. (2009). Weight function approach for determining crack extension resistance based on the cohesive stress distribution in concrete. *Engineering Fracture Mechanics* 76: 1131-1148.
27. Kumar S. and Barai S.V. (2009). Determining double- K fracture parameters of concrete for compact tension and wedge splitting tests using weight function. *Engineering Fracture Mechanics* 76: 935-948.
28. Kumar S. and Barai S.V. (2008). Influence of specimen geometry and size-effect on the K_R -curve based on the cohesive stress in concrete. *International Journal of Fracture* 152: 127-148.
29. Kumar S. and Barai S.V. (2008). Influence of specimen geometry on determination of double- K fracture parameters of concrete: A comparative study. *International Journal of Fracture* 149: 47-66.

National Journal

1. Kumar S. and Barai S.V. (2008). Cohesive crack model for the study of nonlinear fracture behaviour of concrete. *Journal of Institution of Engineers (India)*, CV 89 (Nov.):7-15.
2. Kumar S. and Yadav N.K. (2008). Predicting shear strength of reinforced concrete beams with stirrups using neural networks. *Journal of Institution of Engineers (India)*, CV 89 (May): 1-7.
3. Kumar S. (2006). Application of ANN for predicting the shear strength of RC beams without web reinforcement. *Journal of Structural Engineering*, SERC, Chennai 33 (4): 339-348.
4. Kumar S (2006). Flexural strength of reinforced concrete beams with and without fibers. *Journal of Structural Engineering*, SERC, Chennai 32 (6): 455-467.
5. Kumar S. (2005). Modelling steel stress at shear failure of reinforced concrete beams without web reinforcement. *Journal of the Indian National Group of the International Association for Bridge and Structural Engineering, The Bridge and Structural Engineer*, New Delhi 35(4): 1-15.
6. Kumar S. (2004). Flexural analysis of reinforced concrete beams with steel fibers. *Journal of the Indian National Group of the International Association for Bridge and Structural Engineering, The Bridge and Structural Engineer*, New Delhi 34(3): 13-27.
7. Kumar S. (2004). Shear strength of reinforced steel fibrous concrete corbels without shear reinforcement. *Journal of Institution of Engineers (India)*, CV 85 (Nov.): 202-212.
8. Choudhary A.K, Kumar S. and Verma, B.P. (2004). Pressure moulded blocks with lateritic soils. *Journal of Institution of Engineers (India)*, CV 85 (Nov.): 159-162.
9. Paswan K., Kumar S. and S.P. Ray (2000). Shear strength of reinforced fibrous concrete beams without web reinforcement. *Journal of the Indian National Group of the International Association for Bridge and Structural Engineering, The Bridge and Structural Engineer*, New Delhi, 30 (3): 17-29.

Publications in International Conferences/Seminars

1. Pradhan S., Tiwari B.R., Kumar S. and Barai S.V. (2019). Comparative LCA of natural and recycled coarse aggregate production in India. *UKIERI Concrete Congress - Concrete: The Global Builder, Jalandhar, India.*
2. Pradhan S., Kumar S. and Barai S.V. (2018). Perspectives on the Local Solution for the Global Problem: Recycled Aggregates as a Sustainable Construction Building Material. *Proceedings of the International Conference on Sustainable Globalization, Kerala, India.*
3. Pradhan S., Kumar S. and Barai S.V. (2018). Recycled Aggregate Concrete: Particle Packing Method (PPM) of Mix Design Approach. Proceedings in Recent Advances in Structural Engineering: Volume 1 (Edited by Dr. A. Rama Mohan Rao and Dr. K. Ramanjaneyulu), pp: 759-772.
4. Pradhan S., Kumar S. and Barai S.V. (2017). A Novel Study on Mechanism of Internal Curing in Recycled Aggregate Concrete Using X-Ray Microtomography. *Proceedings of the 2nd International RILEM/COST Conference on Early Age Cracking and Serviceability in Cement-based Materials and Structures, ULB-VUB, Brussels, Belgium*, pp. 467-472
5. Choubey R.K and Kumar S. (2017). Study on the Effect of concrete strength on Double -K Fracture Parameters. Abstract (BCS-82) published in Proc. of *International Conference on Bharat Rejuvenation (ICBR 2017)*, 15th – 17th October, 2017, at Guru Ghasidas Vishwavidyalaya Bilaspur (C.G.), pp. 196.
6. Kumar S. and Choubey R.K. (2017). RAC: Approach to Sustainable Development. Abstract (BCS-83) published in Proc. of *International Conference on Bharat Rejuvenation (ICBR 2017)*, 15th – 17th October, 2017, at Guru Ghasidas Vishwavidyalaya Bilaspur (C.G.), pp. 196.
7. Pradhan S., Kumar S. and Barai S.V. (2016). Comparative study of mechanical properties of recycled aggregate concrete. *Proceedings of International Conference on Recent Advances in Mechanics and Materials (ICRAMM-2016), VSSUT Burla, India.*
8. Pradhan S., Kumar S. and Barai S.V. (2016). Recycled aggregate concrete: Particle Packing Method (PPM) of mix design approach. *Proceedings of the Structural Engineering Convention (SEC-2016), CSIR-SERC, Chennai, India.*
9. Kumar S. and Barai S.V. (2009). Effect of kink-point in bilinear softening on load-displacement response of pre-cracked concrete beam. Proc. of the *International Conference on Advances in Concrete, Structural and Geotechnical Engineering (ACSGE 2009)*, October 25-27, 2009, Civil Engineering Group, Birla Institute of Technology & Science, Pilani, India, pp. 162 (in Abstract Proc.).
10. Kumar S. and Barai S.V. (2008). Influence of specimen geometry on double-K fracture parameters of concrete. Proc. of the *Interquadrennial Conference of International Congress on Fracture 2008 (IQCIF 2008)*, August 3-7, 2008, Indian Institute of Science, Bangalore, India, pp. 82-84.
11. Kumar S. and Barai S.V. (2008). Prediction of double-K fracture parameters for notched concrete beams. Proc. of the *The Eleventh East Asia-Pacific Conference on Structural Engineering and Construction (EASEC-11)*, Nov. 19-20, 2008, Taipei International Convention Centre, National Taiwan University, Taipei, Taiwan, pp. 498-499.
12. Kumar S. and Barai S.V. (2008). Influence of softening function on concrete fracture using cohesive crack model. Proc. of the *International Union of Theoretical And Applied Mechanics, 22nd International Congress of Theoretical and Applied Mechanics (ICTAM 2008)*, August 24-29, 2008, Adelaide, Australia, CD-ROM proceedings ISBN 978-0-9805142-1-6, pp. 51.
13. Kumar S. and Barai S.V. (2007). Numerical simulation on concrete fracture and size effect using cohesive crack model. Proc. of the *International conference on Theoretical, Applied, Computational and Experimental Mechanics (ICTACEM-2007)*, Department of Aerospace Engineering, I.I.T., Kharagpur Dec. 27-29, 2007, pp. 348-350 & ICTACEM-2007/152/1-13.
14. Kumar S. and Choudhary A.K. (2008). Use of hollow concrete blocks in low cost construction. Proc. *7th International Congress Concrete: Construction's Sustainable Option Dundee, Scotland* 8-10 July 2008.

Publications in National Conferences/Seminars

1. Kumar S. (2015). Recent Innovation in Earthquake Resistant Techniques. National Conference on “Recent Innovation in Earthquake Resistant Techniques” during 9-10 November 2015 at RVS College of Engineering & Technology, Jamshedpur.

2. Kumar S. and Barai S.V. (2008). Fracture behavior of concrete compact tension specimen using cohesive crack model. Proc. of the *Sixth Structural Engineering Convention (SEC-2008)*, December 18-20, 2008, Structural Engineering Research Centre, Taramani, Chennai, India, pp. 953-962.
3. Kumar S. and Barai S.V. (2008). Fracture properties of concrete from cohesive crack model and size effect model. Proc. of the *Conference on Challenges and Applications of Mathematical Modeling Techniques in Building Science and Technology (CAM2TBST)*, Feb. 7-8, 2008, CBRI, Roorkee, India, pp. 84-91.
4. Choudhary A.K., Kumar S. and Verma B.P. (2006). Pressure moulded cement stabilised mud blocks for low cost construction. Proc. of *National Conference on Application of Recycled & Marginal Materials in Construction (ARMICON 2006)*, Deptt. of Civil Engg., M.S. Ramaiah Institute of Technology, Bangalore, 19-20, May, 2006.
5. Kumar S., Choudhary A.K. and Verma B.P. (2006). Prediction of splitting tensile strength of recycled aggregate concrete. Proc. of *National Conference on Application of Recycled & Marginal Materials in Construction (ARMICON 2006)*, Deptt. of Civil Engg., M.S. Ramaiah Institute of Technology, Bangalore, 19-20, May, 2006.
6. Kumar S. and Srivastava A.K.L. (2004). An introduction of ANN and its application to civil engineering problem. Proc. *National Conference on Mathematical Modeling and Analysis (NCMMA 04)*, Oct. 8-9, 2004, at Mathematics group, BITS, Pilani – 333 031.
7. Kumar S., Jha S. K. and Verma B.P. (2000). Best fit equations for concrete mix design. Proc. *National Seminar on High Performance Concrete Composites*, Dec. 28-29, 2000, ICFRC, Chennai, pp.: HPC 4-1-HPC 4-14.
8. Choudhary A.K., Kumar S., Prasad B.K. and Ray S.P. (2000). Tensile strength of steel fibre reinforced concrete using brick aggregates. Proc. *Advances in Concrete Technology*, (ACC-2000), 21-22 Sept. 2000, Thapar Institute of Engineering and Technology.
9. Choudhary A.K., Kumar S. and Verma B.P. (2000). Workability and strength characteristics of fibre reinforced slag aggregate concrete. Proc. *Advances in Concrete Technology (ACC-2000)*, 21-22 Sept. 2000, Thapar Institute of Engineering and Technology, Patiala.
10. Kumar S., Choudhary A.K. and Verma B.P. (2000). An analytical method for proportioning of aggregates and mix design of slag aggregate concrete. Proc. *National Seminar on Advances in Cement & Concrete*, (ACC-2000), 10-11 March 2000, B.I.E.T., Jhansi., pp: 92-101.
11. Kumar S., Choudhary A.K. and Verma B.P. (1999). Workability and strength characteristics of slag aggregate concrete-An experimental investigation. Proc. *National Seminar on Recent Trends In Concrete Technology*, May 7-8, 1999, K.I.T., Coimbatore, pp.: 1-13.
12. Choudhary A.K., Kumar S., and Ray S.P. (1999). Environmental effect of curing on strength of concrete. Proc. *National Seminar on Construction Management for Sustainable Infrastructure Development (CMSID-99)*, 3-4 April, 1999, M.I.T.S., Gwalior.
13. Verma B.P., Choudhary A.K. and Kumar S. (1997). Housing in earthquake prone areas. Proc. *Eco Friendly Building Materials & Construction*, 24-26th Sept. 1997, The Institution of Engineers (India), Portblair, pp. 17-25.
14. Kumar S., Choudhary A.K. and Verma B.P. (1997). Workability and strength characteristics of blast furnace slag concrete - An experimental investigation. Proc. *National Conference on Cost Effective Materials and Techniques for Mass Housing*, June 27-28, 1997, J.N.T.U., Anantpur, pp. 81-91.
15. Verma, B.P., Choudhary, A.K. and Kumar S. (1996). An experimental investigation on blast furnace-slag concrete. Proc. *National Seminar on Advances in Low & no Waste Technology*, Dec. 6-7, 1996, Jamshedpur, pp IS.41-IS.49.

Membership of Professional Societies

1. Life membership of The Indian Society for Technical Education (LM39732)
2. Life membership of The Institution of Engineers (India) (AM091173-1).
3. Life membership of The Indian Society for Rock Mechanics and Tunnelling Technology (LM1647).
4. Senior Member of International Union of Laboratories and Experts in Construction Materials, System and Structures (RILEM 19755-2014).