Ravi Ranade, PhD, PE

Assistant Professor of Civil, Structural and Environmental Engineering
University at Buffalo, State University of New York (SUNY)

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Google Scholar Profile: https://goo.gl/dolxO8
ResearchGate Profile: https://www.researchgate.net/profile/Ravi_Ranade/publications

RESEARCH INTERESTS

- Performance-based design and investigation of advanced concrete materials
- Rebar corrosion and rehabilitation of transportation infrastructure
- Impact, blast, and thermal effects on structural and material performance
- Integrated resilience-sustainability assessments of infrastructure
- Multi-scale modeling to investigate the linkages between material, structure, and system performance

EDUCATION

University of Michigan, Ann Arbor, MI

PhD, Civil Engineering (Structural Materials) 2014
Thesis Title: Advanced Cementitious Composite Development for Resilient and Sustainable Infrastructure

Graduate Certificate, Industrial Ecology 2012

Master of Science, Structures and Materials Engineering 2009

Indian Institute of Technology, Mumbai, India

Bachelor of Technology, Civil Engineering 2007

APPOINTMENTS

University at Buffalo, State University of New York

Assistant Professor, Civil, Structural & Environmental Engineering Dept. Aug 2014-present

University of Michigan Ann Arbor

Post-doctoral Research Fellow, Civil & Environmental Engineering Dept. Jan-July 2014

Graduate Research Assistant, Civil & Environmental Engineering Dept. 2009-2013

PART-TIME RESEARCH EXPERIENCES

US Army Engineer Research and Development Center (ERDC), Vicksburg, MS
Survivability Division, Geotechnical and Structures Laboratory 2011, 2012

Delft University of Technology (TU Delft), Delft, Netherlands
Microlab, Department of Civil Engineering and Geosciences May 2010

Pacific Disaster Center, Kihei, HI
Megacities Project: Profiling Mumbai, India May-July 2006

AWARDS AND HONORS

- University at Buffalo CSTEP Distinguished Research Mentor Award — May 2017
- Society for Experimental Mechanics 2015 – Best Paper Award in the area of Dynamic Behavior of Materials — March 2016

University of Michigan, Ann Arbor, MI

- "Richard and Eleanor Towner Prize" for the most *Outstanding PhD Research* in the College of Engineering — 2012
- Pre-Doctoral Fellowship, Rackham Graduate School — 2012-13
- Outstanding Student Instructor Award, American Society of Engineering — 2009
- International Student Fellowship, Rackham Graduate School — 2009
- Member of Tau-Beta-Pi Honor Society — 2009-present
- Distinguished Achievement Graduate Fellowship, Civil & Environmental Engineering — 2007-08

Indian Institute of Technology, Mumbai, India

- Vidyasagar Nehra Gold Medal the most outstanding graduating Civil Engineering Undergraduate Student — 2007
- Institute Merit Scholarship covering 50% of tuition costs for three years — 2005-2007

RESEARCH GRANTS

- Sponsor: *IS4S* (contracted by *US Army Engineer Research and Development Center*)
  Title: Parametric Design Code for Concrete
  PI: Ravi Ranade ($253,000) RF Award #79682
  October 2017-March 2019

- Sponsor: *SEAOI Structural Engineers Foundation*
  Title: Application of ductile concretes in thin-walled concrete filled steel tubes
  PI: Ketan Ragalwar, Ravi Ranade, and Michel Bruneau (Total Budget: $2,500; My contribution: 25%)
  December 2017

- Sponsor: *US Army Engineer Research and Development Center*
  Title: Systematic Optimization Method for Penetration-resistant Quasi-brittle Composite Materials
  PI: Ravi Ranade ($146,827) RF Award #76614
  September 2016-August 2017

- Sponsor: *National Science Foundation: SBIR*
  Title: Self-Consolidating Fiber Reinforced Concrete (FRC) in the deployable flood walls
  PI: Jorge Baiz; Consultants: Dr. Amjad Aref, Dr. Andre Filiatrault, Dr. Ravi Ranade, Dr. Joseph Mollendorf, and Mr. William Coulbourne (Total Budget: $225,000; My contribution: 10%) June, 2016-May, 2017

- Sponsor: *Sandia National Laboratories*
  Title: Development of Penetration-Resistant Ultra-high Performance Concrete (PR-UHPC) with low-cost, local materials
  PI: Ravi Ranade ($111,705) RF Award #74243
  November 2015-September 2016

PUBLICATIONS

Google Scholar Profile: https://goo.gl/dolxO8
ResearchGate Profile: https://www.researchgate.net/profile/Ravi_Ranade/publications

Patent

Li, V.C., **Ranade**, **R.**, Stults, M.D., Rushing, T.S., Heard, W.F. & Cummins, T.K. (2012) "Strain Hardening Brittle Matrix Composites with High Strength and High Tensile Ductility." *Patent Application No. 13/541,189,* United States.

Journal Articles (*P, *U shows **P**hD and **U**ndergraduate students supervised at UB)

1. **Ranade, R.**, Li, V.C., Heard, W.F. & Williams, B.A. (2017). "Impact Resistance of High Strength-High Ductility Concrete." *Cement and Concrete Research*, 98, 24-35.
2. Nematollahi, B., **Ranade, R.**, Sanjayan, J. & Ramakrishnan, S. (2017). "Thermal and Mechanical Properties of Sustainable Lightweight Strain Hardening Geopolymer Composites." *Archives of Civil and Mechanical Engineering*, 17(1), 55-64.
3. Choi, J-I., Lee, B.Y., **Ranade, R.** & Li, V.C. (2016). "Ultra-high-ductile Behavior of a Polyethylene Fiber-Reinforced Alkali-Activated Composite." *Cement and Concrete Composites*, 70, 153-158.
4. **Ranade, R.**, Li, V.C. & Heard, W.F. (2015). "Tensile Rate Effects in High Strength-High Ductility Concrete." *Cement and Concrete Research*, 68, 94-104.
5. Zhang, Q., **Ranade, R.** & Li, V.C. (2014). "Feasibility Study on Fire-Resistive Engineered Cementitious Composites." *ACI Materials Journal*, 111(6), 651-660.
6. **Ranade, R.**, Zhang, J., Lynch, J.P. & Li, V.C. (2014). "Influence of Micro-Cracking on the Composite Resistivity of ECC." *Cement and Concrete Research*, 58, 1-12.
7. Felekoglu, B., Tosun-Felekoglu, K., **Ranade, R.**, Huang, X. & Li V.C. (2013). "Influence of Matrix Flowability, Fiber Mixing Procedure, and Curing Conditions on the Mechanical Performance of HTPP-ECC." *Composites Part B: Engineering Journal*, 60, 359-70.
8. Tosun-Felekoglu, K., Felekoglu, B., **Ranade, R.**, Lee, B.Y. & Li, V.C. (2013). "The Role of Flaw Size and Fiber Distribution on Tensile Ductility of PVA-ECC." *Composites Part B: Engineering Journal*, 56, 536-45.
9. Huang, X., **Ranade**, **R.**, Zhang, Q., Ni, W. & Li, V.C. (2013). "Mechanical and Thermal Properties of Green Lightweight Engineered Cementitious Composites." *Construction and Building Materials*, 48, 954-60.
10. **Ranade, R.**, Li, V.C., Stults, M.D., Heard, W.F. & Rushing, T.S. (2013). "Composite Properties of High Strength-High Ductility Concrete." *ACI Materials Journal*, 110(4), 413-22.
11. **Ranade, R.**, Li, V.C., Stults, M.D., Rushing, T.S., Roth, J. & Heard, W.F. (2013). "Micromechanics of High Strength-High Ductility Concrete." *ACI Materials Journal*, 110(4), 375-84.
12. Huang, X., **Ranade, R.**, Ni, W. & Li, V.C. (2013). "Development of Green Engineered Cementitious Composites Using Iron Ore Tailings as Aggregates." *Construction and Building Materials*, 44, 757-64.
13. Huang, X., **Ranade, R.**, Ni, W. & Li, V.C. (2013). "On the Use of Recycled Tire Rubber to Develop Low Modulus ECC for Durable Concrete Repairs." *Construction and Building Materials*, 46, 134-41.
14. Huang, X., **Ranade, R.** & Li, V.C. (2012). "Feasibility Study of Developing Green ECC Using Iron Ore Tailings (IOTs) Powder as Cement Replacement." *Journal of Materials in Civil Engineering*, 25(7), 923-31.

15. Sahmaran, M., Lachemi, M., Hossain, K., **Ranade, R.** & Li, V.C. (2009). "Influence of Aggregate Type and Size on the Ductility and Mechanical Properties of ECC." *ACI Materials Journal*, 106(3), 308-16.

Peer-reviewed Conference Papers (*[P], *[U] shows **P**hD and **U**ndergraduate students supervised at UB)

1. Deshpande, A.*[P], Kumar, D.*[P], Mourougassamy, A.*[U] & **Ranade, R.** (2017). "Development of a Steel-PVA Hybrid Fiber SHCC." In Proc. of 4th RILEM Conference on SHCC, 18-20 September, 2017, Dresden, Germany, pp. 195-202.

2. Fakhri, H.*[P], Han, Y.*[U] & **Ranade, R.** (2017). "SHCC Covers for Improving Corrosion Resistance of Reinforced-Concrete Structural Elements." In Proc. of 4th RILEM Conference on SHCC, 18-20 September, 2017, Dresden, Germany, pp. 608-615.

3. Ragalwar, K.*[P], Nguyen, H.*[U], **Ranade, R.**, Heard, W.F. & Williams, B.A. (2017). "Influence of Distribution Modulus of Particle Size Distribution on Rheological and Hardened Properties of an Ultra-High-Strength SHCC." In Proc. of 4th RILEM Conference on SHCC, 18-20 September, 2017, Dresden, Germany, pp. 221-229.

4. **Ranade, R.**, Fakhri, H.*[P] & Ragalwar, K.*[P] (2016). "Feasibility of Utilizing Ductile Concrete Cover to Mitigate Rebar Corrosion in Reinforced-Concrete Bridge Piers." In Proc. of *9th RILEM International Conference on Fiber Reinforced Concrete* (BEFIB-9), 19-21 September, 2016, Vancouver, Canada, pp. 521-531.

5. Ragalwar, K.*[P], Prieto, V.*[U], Fakhri, H.*[P], Heard, W.F., Williams, B.A. & **Ranade, R.** (2016). "Development of Environmentally Sustainable Ultra High Performance Concrete." In Proc. of *HiPerMat-2016 Conference*, 9-11 March, 2016, Kassel, Germany.

6. **Ranade, R.**, Heard. W.F. & Williams, B.A. (2016). "Multi-scale Mechanical Performance of High Strength-High Ductility Concrete." In Proc. of *SEM-2015 Conference*, 8-11 June, 2015, Costa Mesa, CA, pp. 93-101. (*Received the **Best Paper Award** in the area of Dynamic Behavior of Materials at SEM-2015 Conference*)

7. **Ranade, R.** & Li, V.C. (2015). "Interfacial Bond Tailoring for Crack Width Reduction in High Strength-High Ductility Concrete (HSHDC)." In Proc. of *RILEM HPRCC-7*, 1-3 June, 2015, Stuttgart, Germany, pp. 359-366.

8. **Ranade, R.** & Li, V.C. (2014). "Material Model for simulating SHCC in LS-Dyna." In Proc. of *RILEM SHCC-3*, 3-5 November, 2014, Dordrecht, Netherlands, pp. 235-242.

9. **Ranade, R.**, Stults, M.D., Li, V.C., Rushing, T.S., Roth, J. & Heard, W.F. (2011). "Development of High Strength-High Ductility Concrete." In Proc. of *RILEM SHCC-2*, 12-14 December, 2011, Rio de Janeiro, Brazil, pp. 1-8.

10. **Ranade, R.**, Stults, M.D., Lee, B.Y. & Li, V.C. (2011). "Effects of Fiber Dispersion and Flaw Size Distribution on the Composite Properties of PVA-ECC." In Proc. of *RILEM HPRCC-6*, 19-22 June, 2011, Ann Arbor, MI. pp. 106-113.

11. Li, M., **Ranade, R.**, Kan, L. & Li, V.C. (2010). "On Improving the Infrastructure Service Life Using ECC to Mitigate Rebar Corrosion." In Proc. of *RILEM 2nd International Symposium on Service Life Design for Infrastructure*, 4-6 October, 2010, Delft, Netherlands. pp. 773-781.

12. Stults, M.D., **Ranade, R.**, Li, V.C. & Rushing, T.S. (2010). "Mechanical Effects of Rice Husk Ash in Ultra-High Performance Concretes: A Matrix Study." In Proc. of *Advances in Cement-Based Materials,* 17-19 November, 2009, South Africa. Leiden, Netherlands: CRC Press/Balkema, pp. 307-312.

Workshop/Symposium Papers

1. **Ranade, R.**, Basaran, C. & Fakhri, H. (2017). "Ductile Fiber-reinforced Concrete for Corrosion Mitigation in Reinforced Concrete Structures: Experiments and Theory." In Proc. of ASNE MEGARUST, 20-22 June, 2017, Newport News, VA.
2. Soltan, D., **Ranade, R.** & Li, V.C. (2014). "A Bio-Inspired, Cementitious Composite for High Energy Absorption." In Proc. of *13th International Symposium on Multiscale, Multifunctional and Functionally Graded Materials*, 19-22 October, 2014, Sao Paulo, Brazil, pp. 1-4.
3. Rushing, T.S., Burroughs, J.F., Williams, B.A., Heard, W.F., **Ranade, R.** & Li, V.C. (2012). "Both High Strength and High Ductility Achieved With Concrete." *56th Int'l SAMPE Symposium*, 21-24 May 2012, Baltimore, MD.

Select Book Chapters, Presentations and Reports

1. **Ranade, R.** (2017). "Advanced Concrete Materials." Presentation at the 77th NY State Association of Transportation Engineers (NYSATE), Buffalo, NY (Jun 1, 2017).
2. **Ranade, R.** (2017). "Advanced Concrete Materials." Presentation at Erie-Niagara Chapter of NY State Society of Professional Engineers Symposium, Buffalo, NY (Feb 24, 2017).
3. **Ranade, R.** & Picard, J. (2016). "Patching I-86 Bridge Deck with Field-mixed ECC." Presentation at IBE-NYSDOT Bridge Maintenance Office Meeting, Buffalo, NY (Oct 6, 2016).
4. **Ranade, R.** (2015). "Ductile Concrete for Durable Bridge Construction and Maintenance." Presentation at IBE-NYSDOT Bridge Maintenance Office Meeting, Watkins Glen, NY (Sep 23, 2015).
5. **Ranade, R.** (2015). "Utilizing Ductile Concrete Cover to Improve the Durability and Speed-up Construction of Bridge Columns." Presentation at IBE-FHWA Meeting, Turner Fairbank Highway Research Center, McLean, VA (Jun 22, 2015).
6. Johnson, N., **Ranade, R.**, Mahgoub, M. & Lynch, J.P. (2014). "SHM Technologies." Book chapter in Special Publication of ACI 444.1.
7. Martinez, M., Plata, I.R., **Ranade**, **R.,** Zhang, Q. & Li, V.C. (2012). "Feasibility Study of Novel Lego-like Construction Method using ECC." Poster Presentation at the *SROP Symposium*, UM Rackham Building, Ann Arbor, MI (Jul 25, 2012).
8. **Ranade, R.** & Li, V.C. (2012). "Advanced Cementitious Composite Development for Resilient and Sustainable Infrastructure." Poster Presentation at the *Graduate Education Day*, State Capitol Building, Lansing, MI (Mar 29, 2012). This poster was among the 5 chosen from over 200 posters to showcase the University of Michigan's exemplary research activities at the State Capitol Building.
9. Yang, E.H., Garcez, E. O., Li, V.C. & **Ranade, R.** (2011). "Pigmentable Engineered Cementitious Composites." Paper presentation at the *2nd International Conference on Strain Hardening Cementitious Composites* (SHCC2), Rio de Janeiro, Brazil (Dec 12, 2011).
10. **Ranade, R.**, Lin, V.W.J., Li, M., Li, V.C. & Lynch, J.P. (2011). "Mechanical and Electrical Characterization of Self-sensing Carbon Black ECC." Paper Presentation at the *ACI Fall Convention*, Cincinnati, OH (Oct 18, 2011).
11. **Ranade, R.**, Stults, M.D. & Li, V.C. (2010). "Micromechanics-based tailoring of cement-based composites to achieve high performance and environmental sustainability through multi-scale modeling." Presentation at the *Microlab Colloqium*, TU Delft, Netherlands (May 27, 2010).
12. Li, V.C., **Ranade, R.** & Stults, M.D. (2009). "Development of High Strength High Ductility Concrete." *UM/ERDC Annual Report* submitted to the US Army Corps of Engineers, Vicksburg, MS. Ann Arbor, MI: University of Michigan (Dec 31, 2009).

13. Li V.C. & **Ranade, R.** (2009). "Material Research for Sustainability, Structural Safety, and Infrastructure Durability at ACE-MRL." Presentation at the *15th CNSF Annual Exhibition*, Rayburn House Office Building, Washington, DC (Mar 24, 2009).
14. **Ranade, R.** & Li, V.C. (2008). "Modeling Engineered Cementitious Composites." Presentation at the *19th ACBM/NIST Workshop*, Gaithersburg, Maryland (Jun 17, 2008).
15. **Ranade, R.** & Hasan, A. (2006). "Increasing Storm Water Drainage Capacity of Mithi River and Mumbai City drains." *3cd Sound Practice*, Pacific Disaster Center, Hawaii (Jul 31, 2006).

TEACHING EXPERIENCE

University at Buffalo, State University of New York, Buffalo, NY

Instructor, CIE 327 Civil Engineering Materials (# students: 102)	Fall 2017
Instructor, CIE 572/ZRAN Advanced Concrete Materials (# students: 31)	Spring 2017
Instructor, CIE 327 Civil Engineering Materials (# students: 107)	Fall 2016
Instructor, CIE 500 RAN/ZRAN Advanced Concrete Materials (# students: 14)	Spring 2016
Instructor, CIE 327 Civil Engineering Materials (# students: 109)	Fall 2015
Instructor, CIE 500 RAN/ZRAN Advanced Concrete Materials (# students: 9)	Spring 2015
Instructor, CIE 327 Civil Engineering Materials (# students: 93)	Fall 2014
Instructor, CIE 361 Civil Engineering Lab-1 (# students: 104)	Fall 2014

University of Michigan, Ann Arbor, MI

Graduate Student Instructor, Course: CEE 351 Civil Eng. Materials — Fall 2008*, 2009, 2010
*Received the **"Outstanding Student Instructor Award"** for this course from the American Society of Engineering Education (ASEE).

PROFESSIONAL AFFILIATIONS AND CERTIFICATIONS

- Licensed Professional Engineer (PE) – Civil: Structural, State of Michigan — 2017
- Associate member of ACI Committee 544: Fiber Reinforced Concrete — 2014-present
- Associate Member of ACI, ASCE, PCI, and RILEM — 2007-present
- University of Michigan Training Certificate for *Responsible Conduct of Research and Scholarship* — 2013
- University of Michigan *Graduate Teacher Certificate* — 2012

SERVICE ACTIVITIES

Professional Service

- Scientific Committee Member for the 4th International Conference on Strain-hardening Cement-based Composites (SHCC-4), Dresden, Germany, September 18-20, 2017.
- Department of Energy – Consolidated Innovative Nuclear Research Panel Reviewer
- Technical Committee Member for the 9th RILEM International Symposium on Fiber Reinforced Concrete (BEFIB - 9), Vancouver, Canada, September 19-21, 2016.
- National Science Foundation Panel Reviewer
- Technical reviewer for the following publications (number of manuscripts reviewed given in brackets followed by Google Scholar Civil Engineering Journal ranking by h5 index of journals)
  - Construction and Building Materials (13) (Rank #1)
  - Cement and Concrete Research (4) (Rank #3)
  - Cement and Concrete Composites (5) (Rank #4)
  - ASCE Journal of Structural Engineering (1) (Rank #10)
  - Materials and Structures (1) (Rank #11)
  - ASCE Journal of Materials in Civil Engineering (7) (Rank #12)
  - Journal of Materials and Design (6)
  - International Journal of Concrete Structures and Materials (4)
  - Ceramics International (1)
  - ASTM Journal of Testing and Evaluation (1)
  - Composites Part B: Engineering Journal (1)
  - American Concrete Institute (ACI) Committee Report 232.2R
  - ACI Special Publication: Joint ACI-FIB International Workshop

University at Buffalo, State University of New York

- Faculty Judge for the 10th Annual CSTEP Research Poster Symposium
- Departmental Faculty Review Panel for Structures Faculty Recruitment, Spring 2017
- Departmental Faculty Review Panel for Materials Faculty Recruitment, Spring 2016
- Reorganization of CIE 327: Civil Engineering Materials Course to be consistent with General Education requirements and SUNY-wide seamless transfer
- Institute of Bridge Engineering Faculty Panel: Master's degree and Advanced Certificate curriculum
- Undergraduate student mentoring

NY State Department of Transportation

In a demonstration project with the NY State DOT in September 2016, an advanced concrete material developed by my students at UB has been applied for patching of the I-86 bridge over Chautauqua Lake near Bemus Point, NY. The new material is intended to significantly enhance the durability of bridge repairs.