

CURRICULUM VITAE OF GIANLUCA CUSATIS

:: BIOSKETCH ::

I am a faculty member of the Civil and Environmental Engineering Department at Northwestern University that I joined in August 2011. Prior to joining Northwestern, I worked at Rensselaer Polytechnic Institute for 6 years. I obtained my “Laurea”¹ degree and my PhD in structural engineering from Politecnico Di Milano (Italy). I teach undergraduate and graduate courses of the civil engineering curriculum and perform research in the field of experimental, computational and applied mechanics, with emphasis on heterogeneous and quasi-brittle infrastructure materials. My work on constitutive modeling of concrete through the adoption of the so-called Lattice Discrete Particle Model (LDPM), one of the most accurate and reliable approaches to simulate failure of materials experiencing strain-softening, is known worldwide. In addition, recent work on waterless concrete for Martian constructions has received widespread attention in the technical community and in the media. Within the center for the Sustainable Engineering of Geological and Infrastructure Materials (SEGIM) – for which I serve as co-director – and under the sponsorship of several agencies – including NSF, ERDC, and NRC – my current research focuses on formulating and validating multiscale and multiphysics computational frameworks for the simulation of large scale problems dealing with a variety of different applications including, but not limited to, infrastructure aging and deterioration, structural resiliency, projectile penetration, and design of blast resistance structures. I am member of FraMCoS, ASCE, and ACI, and active in several technical committees. I serve as the chair of the ACI 209 committee on creep and shrinkage and I served as chair of ACI 446 on fracture mechanics. In these two committees I have been leading an effort to develop practical guidelines for the calibration and validation of concrete models. In addition, I serve as treasurer for IA-FraMCoS, president for IA-ConCreep, and I am a member of the EMI Board of Governors.

:: EDUCATIONAL PREPARATION ::

Politecnico di Milano – Milan, Italy *March 2002*
Ph.D. degree in Structural Engineering

- Thesis on mesoscale modeling of concrete
- Teaching Assistanship on structural analysis

Politecnico di Milano – Milan, Italy *July 1998*
“Laurea” degree in Structural Engineering

- Thesis on creep and shrinkage of concrete

:: PROFESSIONAL EXPERIENCE ::

Northwestern University – Evanston, IL *2011 – Present*
Associate Professor

- Co-director of the Center for the Sustainable Engineering of Geological and Infrastructure Materials (SEGIM)
- Leading research activities on the behavior of quasi-brittle infrastructure materials
- Teaching courses of the civil engineering curriculum
- Coordinating the Mechanics, Materials, and Structures (MMS) program

Rensselaer Polytechnic Institute – Troy, NY *August 2005 – July 2011*
Assistant Professor

- Leading research activities on the dynamic behavior of concrete
- Teaching courses of the civil engineering curriculum

Northwestern University – Evanston, IL *June 2004 - July 2005*
Research Associate

- Conducting research on the mesoscale modeling of concrete

Politecnico di Milano – Milan, Italy *April 2002 - May 2004*
Research Associate

- Conducting research on the mesoscale modeling of concrete and steel anchors

¹In the old Italian high educational system the “Laurea” degree was a five year degree equivalent to BS+MS degree

:: LEADERSHIP POSITIONS IN PROFESSIONAL SOCIETIES ::

ASCE, Engineering Mechanics Institute, Board Of Governors, Member	2017 – Present
IA-ConCreep, President	2015 – Present
IA-FraMCoS, Treasurer	2013 – Present
ACI 209, Creep and Shrinkage in Concrete, Chair	2016 – Present
ACI 446, Fracture Mechanics, Chair	2010 – 2016

:: RESEARCH – PUBLICATIONS ::

Books, Monographs, and Book Chapters²

3. **G. Cusatis**, and C. Jin (Eds). *New Frontiers in Oil and Gas Exploration*, Springer. (2016) ISBN 978-3-319-40124-9.
2. W. Li, **G. Cusatis**, and C. Jin. “Integrated Experimental and Computational Characterization of Shale at Multiple Length Scales”. In *New Frontiers in Oil and Gas Exploration*, Springer. (2016). ISBN 978-3-319-40124-9.
1. **G. Cusatis**. “The Lattice Discrete Particle Model (LDPM) for the Numerical Simulation of Concrete Behavior Subject to Penetration”. In *Materials under extreme loadings - Application to penetration and impact*. Wiley. (2010). ISBN: 9781848211841.

Peer Reviewed Journal Articles – Submitted²

6. C. Ceccato, X. Zhou, D. Pelessone, and **G. Cusatis**. “Proper Orthogonal Decomposition Framework for the Explicit Solution of Discrete Systems with Softening Response”. 2017. *ASME Journal of Applied Mechanics*.
5. M. Alnaggar, D. Pelessone, and **G. Cusatis**. “Lattice Discrete Particle Modeling (LDPM) of reinforced concrete beams flexural behavior”. 2017. *ASCE Journal of Engineering Mechanics*.
4. M. Pathirage, F. Bousikane, M. D’Ambrosia, M. Alnaggar and **G. Cusatis**. “Effect of Alkali Silica Reaction on Aging Mortar Bars: Experiments and Numerical Modeling”. *International Journal of Damage Mechanics*.
3. W. Li, Z. Jin, and **G. Cusatis**. “Characterization of Marcellus Shale Fracture Properties through Size Effect Tests and Computations”. *Rock Mechanics and Rock Engineering*.
2. E. Masoero, **G. Cusatis**, G. Di Luzio. “C–S–H gel densification: the impact of the nanoscale on self desiccation and sorption isotherms”. *Cement and Concrete Research*.
1. A. McSwain, K. Berube, **G. Cusatis**, E. Landis. “Confinement Effects on Fiber Pullout Forces for Ultra-High Performance Concrete”. *Cement and Concrete Composites* .

Peer Reviewed Journal Articles – Published and In Press²

47. L. Wan, R. Wendner, and **G. Cusatis**. “Age-dependent Size Effect and Fracture Characteristics of Ultra High Performance Concrete”. *Cement and Concrete Composites*, Volume 85, January 2018, Pages 67-82. <https://doi.org/10.1016/j.cemconcomp.2017.09.010>
46. R. Reza khani, X. Zhou, and **G. Cusatis**. “Adaptive Multiscale Homogenization of the Lattice Discrete Particle Model for the Analysis of Damage and Fracture in Concrete”. *International Journal of Solids and Structures*; <https://doi.org/10.1016/j.ijsolstr.2017.07.016>
45. L. Shen, Q. Ren, L. Zhang, Y. Han, and **G. Cusatis**. “Experimental and Numerical Study of Effective Thermal Conductivity of Cracked Concrete”. *Construction and Building Materials*, Volume 153, 30 October 2017, Pages 55-68. <https://doi.org/10.1016/j.conbuildmat.2017.07.038>
44. R. Frosch, Q. Yu, **G. Cusatis**, and Z. Bažant “A Unified Approach to Shear Design”. *Concrete International*. 39(9), 47-52. September 2017.
43. M. Alnaggar, G. Di Luzio, and **G. Cusatis**. “Modeling Time-Dependent Behavior of Concrete Affected by Alkali Silica Reaction in Variable Environmental Conditions”. 2017 *Materials*. *Materials* 2017, 10(5), 471; doi:10.3390/ma10050471.

²Underlined names are advised students, post-docs, visiting scholars .

42. W. Li, R. Reza khani, C. Jin, X. Zhou, and **G. Cusatis**. “Multiscale Framework for the Simulation of the Anisotropic Mechanical Behavior of Shale”. *International Journal for Numerical and Analytical Methods in Geomechanics*. Feb 2017. doi: 10.1002/nag.2684. Preprint available at <http://arxiv.org/abs/1608.04144>.
41. C. Ceccato, M. Salviato, C. Pellegrino, and **G. Cusatis**. “Simulation of Concrete Failure and Fiber Reinforced Fracture in Confined Columns with Different Cross Sectional Shape”. *International Journal of Solids and Structures*. Volume 108, 1 March 2017, Pages 216–229. <http://dx.doi.org/10.1016/j.ijsolstr.2016.12.017>
40. **G. Cusatis**, R. Reza khani and E. A. Schaufert. “Discontinuous Cell Method (DCM) for the Simulation of Cohesive Fracture and Fragmentation of Continuous Media”. *Engineering Fracture Mechanics*. Volume 170, 1 February 2017, Pages 1–22. <http://dx.doi.org/10.1016/j.engfracmech.2016.11.026>.
39. S. Esna Ashari, G. Buscarnera, and **G. Cusatis**. “Lattice Discrete Particle Model (LDPM) for pressure-dependent inelasticity in granular rocks”. *International Journal of Rock Mechanics and Mining Sciences*. Volume 91, January 2017, Pages 4958. <http://dx.doi.org/10.1016/j.ijrmms.2016.10.007>.
38. E. Lale, X. Zhou, and **G. Cusatis**. “Isogeometric Implementation of High Order Microplane Model for the Simulation of High Order Elasticity, Softening, and Localization”, *Journal of Applied Mechanics*, ASME. 84(1), 011005 (2016); doi: 10.1115/1.4034784.
37. C. Jin, M. Salviato, W. Li, and **G. Cusatis**. “Elastic Microplane Formulation for Transversely Isotropic Materials”. *Journal of Applied Mechanics*, ASME. 84(1), 011001 (2016); doi: 10.1115/1.4034658
36. M. Salviato, V. Chau, W. Li, Z. Bažant, and **G. Cusatis**, “Direct Testing of Gradual Postpeak Softening of Fracture Specimens of Fiber Composites Stabilized by Enhanced Grip Stiffness and Mass”. *Journal of Applied Mechanics*, ASME. 83(11), 111003 (2016); doi: 10.1115/1.4034312.
35. L. Wan, R. Wendner, B. Liang, and **G. Cusatis**, “Experimental and Computational Analysis of the Behavior of Ultra High Performance Concrete at Early Age”. *Cement and Concrete Composites*. 74 (2016) 120–135. <http://dx.doi.org/10.1016/j.cemconcomp.2016.08.005>.
34. M. Salviato, K. Kirane, S. Esna Ashari, Z.P. Bažant, and **G. Cusatis**. “Experimental and Numerical Investigation of Intra-Laminar Energy Dissipation and Size Effect in Two-Dimensional Textile Composites”. *Composites Science and Technology*. 135 (2016), 67-75, <http://dx.doi.org/10.1016/j.compscitech.2016.08.021>.
33. J. Smith, and **G. Cusatis**. “Numerical Analysis of Projectile Penetration and Perforation of Plain and Fiber Reinforced Concrete Slabs”. *International Journal for Numerical and Analytical Methods in Geomechanics*. (2016). doi: 10.1002/nag.2555.
32. Q. Yu, J.-L. Le, M. Hübler, R. Wendner, **G. Cusatis**, Z. Bažant, “Comparison of Main Models for Size Effect on Shear Strength of Reinforced and Prestressed Concrete Beams”. *Structural Concrete*. Accepted Author Manuscript (2016). doi:10.1002/suco.201500126
31. L. Wan, R. Wendner, and **G. Cusatis**, “A Novel Material for In Situ Construction on Mars: Experiments and Numerical Simulations”. *Construction and Building Materials*. 120 (2016) 222-231. <http://dx.doi.org/10.1016/j.conbuildmat.2016.05.046>.
30. R. Reza khani and **G. Cusatis**. “Mathematical Homogenization of Discrete Fine-Scale Models with Rotational Degrees of Freedom for the Simulation of Quasi-Brittle Materials”. *Journal of the Mechanics and Physics of Solids*. 88 (2016) 320–345. <http://dx.doi.org/10.1016/j.jmps.2016.01.001>
29. C. Jin, N. Buratti, M. Stacchini, M. Savoia, **G. Cusatis**. “Lattice Discrete Particle Modeling of Fiber Reinforced Concrete: Experiments and Simulations”. *European Journal of Mechanics – A/Solids*. 57 (2016) 85–107. <http://dx.doi.org/10.1016/j.euromechsol.2015.12.002>
28. M. Salviato, S. Esna Ashari, and **G. Cusatis**, “Spectral Stiffness Microplane Model for Damage and Fracture of Textile Composites”. *Composite Structures*, 137 (2016) 170–184. doi:10.1016/j.compstruct.2015.10.033.
27. M. Alnaggar, M. Liu, J. Qu, and **G. Cusatis**. “Lattice Discrete Particle Modeling of Acoustic Nonlinearity Change in Accelerated Alkali Silica Reaction (ASR) Tests”. *Materials and Structures Journal*. (2015) 49(9), 3523-3545. <http://dx.doi.org/10.1617/s11527-015-0737-9>
26. X. Zhou and **G. Cusatis**. “A tetrahedral finite element with rotational degrees of freedom for Cosserat and Cauchy continuum problems”. *ASCE Journal of Engineering Mechanics*. (2015). 141(2), 06014017. [http://dx.doi.org/10.1061/\(ASCE\)EM.1943-7889.0000868](http://dx.doi.org/10.1061/(ASCE)EM.1943-7889.0000868).

25. R. Wendner, J. Vorel, J. Smith, C. Hoover, Z.P. Bažant, **G. Cusatis**. “Characterization of Concrete Failure Behavior: A Comprehensive Experimental Database for the Calibration and Validation of Concrete Models”. *RILEM Materials and Structures*. (2014). Pages 1-24. <http://dx.doi.org/10.1617/s11527-014-0426-0>.
24. J. Smith, **G. Cusatis**, D. Pelessone, Eric Landis, J. O’Daniels, and J. Baylot. “Lattice Discrete Particle Modeling of Ultra High-Performance Fiber-Reinforced Concrete for Projectile Penetration Simulations”. *International Journal of Impact Engineering*. Volume 65, March 2014, Pages 13-32.
23. **G. Cusatis** and X. Zhou. “High-Order Microplane Theory for Quasi-Brittle Materials with Multiple Characteristic Lengths”. *ASCE Journal of Engineering Mechanics*. 10.1061/(ASCE)EM.1943-7889.0000747 (Nov. 4, 2013).
22. M. Alnagar, **G. Cusatis**, and G. Di Luzio. “Lattice Discrete Particle Modeling of Alkali-Silica-Reaction (ASR) Deterioration of Concrete Structures”. *Cement and Concrete Composites Journal*. Volume 41, August 2013, Pages 45-59.
21. G. Di Luzio and **G. Cusatis**. “Solidification-Microprestress-Microplane (SMM) Theory for Concrete at Early Age. Theory, Validation and Application”. *International Journal of Solids and Structures*. Volume 50, issue 6 (March 15, 2013), pp. 957-975.
20. E. A. Schaufert, **G. Cusatis**, Pelessone, D., O’Daniel, J., and Baylot, J. “Lattice Discrete Particle Model for Fiber Reinforced Concrete (LDPM-F): II Tensile Fracturing and Multiaxial Loading Behavior”. *ASCE Journal of Engineering Mechanics*. 2012, 138(7), 834-841.
19. E. A. Schaufert and **G. Cusatis**. “Lattice Discrete Particle Model for Fiber Reinforced Concrete (LDPM-F): I Theory”. *ASCE Journal of Engineering Mechanics*. 2012, 138(7), 826-833.
18. **G. Cusatis** and H. Nakamura. “Discrete modeling of concrete materials”, Preface to the Special Issue on discrete models, *Cement and Concrete Composites*. 2011, 33, 865-866.
17. **G. Cusatis**, A. Mencarelli D. Pelessone, and J.T. Baylot. “Lattice Discrete Particle Model (LDPM) for Failure Behavior of Concrete. II: Calibration and Validation”. *Cement and Concrete Composites*. 2011, 33(9), pp. 891-905.
16. **G. Cusatis**, D. Pelessone, and A. Mencarelli. “Lattice Discrete Particle Model (LDPM) for Concrete failure Behavior of Concrete. I: Theory”. *Cement and Concrete Composites*. 2011, 33(9), pp. 881-890.
15. **G. Cusatis**. “Strain Rate Effects on Concrete Behavior”. *International Journal of Impact Engineering*. 2011, 38(4), pp. 162-170.
14. G. Di Luzio and **G. Cusatis**. “Hygro-Thermo-Chemical Modeling of High Performance Concrete. II: Calibration and Validation”. *Cement and Concrete Composites*. 2009, 31(5), pp. 309-324.
13. G. Di Luzio and **G. Cusatis**. “Hygro-Thermo-Chemical Modeling of High Performance Concrete. I: Theory”. *Cement and Concrete Composites*. 2009, 31(5), pp. 301-308.
12. **G. Cusatis** and E. A. Schaufert. “Cohesive Crack Analysis of Size Effect”. *Engineering Fracture Mechanics*. 2009, 76, pp. 2163-2173.
11. L. Cedolin and **G. Cusatis**. “Identification of Concrete Fracture Parameters through Size-Effect Experiments”. *Cement and Concrete Composites*. 2008, 30, pp. 788-797.
10. L. Cedolin, **G. Cusatis**, S. Eccheli, and M. Roveda. “Capacity of Rectangular Cross Sections Under Biaxial Eccentric Loads”, *ACI Structural Journal*. 2008, 105(2), pp. 215-224.
9. A. Beghini, **G. Cusatis**, and Z.P. Bažant. “Spectral Stiffness Microplane Model for Quasi-Brittle Composite Laminates: II. Validation and Calibration”. *Journal of Applied Mechanics*, ASME, 2008, 75(2), pp. (021009)1-9.
8. **G. Cusatis**, A. Beghini, and Z.P. Bažant. “Spectral Stiffness Microplane Model for Quasi-Brittle Composite Laminates: I. Theory”. *Journal of Applied Mechanics*, ASME, 2008, 75(2), pp. (021010)1-6.
7. L. Cedolin, and **G. Cusatis**. “Cohesive Fracture in Concrete: Theoretical Aspects and Experimental Evidence”, *Studies and Researches - Politecnico di Milano*, ed. by A. Migliacci, P.G. Gambarova, and F. Mola, publ. by Starrylink (Brescia, Italy), 2007, Vol. 27, pp. 167-192.
6. **G. Cusatis** and L. Cedolin. “Two-scale Analysis of Concrete Fracturing Behavior”. Invited paper for the special issue of *Engineering Fracture Mechanics*, 2007, 74(1-2), pp. 3-17.

5. L. Cedolin, **G. Cusatis**, S. Eccheli, and M. Roveda. “Biaxial bending of concrete columns: an analytical solution”, *Studies and Researches - Politecnico di Milano*, ed. by A. Migliacci, P.G. Gambarova, and F. Mola, publ. by Starrylink (Brescia, Italy), 2006, Vol. 26, pp. 163-192.
4. **G. Cusatis**, Z.P. Bažant and L. Cedolin. “Confinement-Shear Lattice CSL Model for Fracture Propagation in Concrete”. Invited paper for the special issue of *Computer Methods for Applied Mechanics and Engineering* entitled Computational Modelling of Concrete, 2006, 195(52), pp. 7154-7171.
3. Z.P. Bažant, **G. Cusatis** and L. Cedolin. “Temperature Effect on Concrete Creep Modeled by Microprestress-Solidification Theory”. *Journal of Engineering. Mechanics*, ASCE, 2004, 130(06), pp. 691-699.
2. **G. Cusatis**, Z.P. Bažant and L. Cedolin. “Confinement-Shear Lattice Model for Concrete Damage in Tension and Compression. II: Numerical implementation and Validation”. *Journal of Engineering. Mechanics*, ASCE, 2003, 129(12), pp. 1449-1458.
1. **G. Cusatis**, Z.P. Bažant and L. Cedolin. “Confinement-Shear Lattice Model for Concrete Damage in Tension and Compression. I: Theory”. *Journal of Engineering Mechanics*, ASCE, 2003, 129(12), pp. 1439-1448.

Articles in Conference Proceedings³

63. *L. Wan-Wendner, J. Vorel, A. Strauss, **G. Cusatis**, R. Wan-Wendner. “Discrete modeling of reinforced and prestressed concrete beams under shear loads”, *39th IABSE Symposium - Engineering the future (IABSE 2017)*. September 21–23, 2016. Vancouver, Canada.
62. *C. Ceccato, X. Zhou, D. Pelessone, C. Pellegrino, **G. Cusatis**, “Reduced Order Approximation of the Lattice Discrete Particle Model for the Simulation of FRP Confined Concrete Columns”, *8th International Conference on Fibre-Reinforced Polymer (FRP) Composites in Civil Engineering (CICE 2016)*. December 14–16, 2016. Hing Kong, China.
61. *R. El-Helou, E. Lale, C. Moen and **G. Cusatis**. “Ultra-High Performance Concrete Compression and Fracture Response Parameters for Lattice Discrete Particle Model Simulations”, *First International Interactive Symposium on UHPC (UHPC 2016)*. July 18–20, 2016. Electronic Proceedings (available at astate.edu/uhpc2016). Des Moines (IW), USA.
60. *L. Wan, R. Wendner, and **G. Cusatis**. “Behavior of Ultra High Performance Concrete at Early Age: Experiments and Simulations”, *First International Interactive Symposium on UHPC (UHPC 2016)*. July 18–20, 2016. Electronic Proceedings (available at astate.edu/uhpc2016). Des Moines (IW), USA.
59. *C. Jin, M. Du, J. Feng, X. Zhou, and **G. Cusatis**. “Experimental and Numerical Characterization of Pull-out Behavior of Hooked Steel Fibers in Ultra-High Performance Cementitious Matrix”, *First International Interactive Symposium on UHPC (UHPC 2016)*. July 18–20, 2016. Electronic Proceedings (available at astate.edu/uhpc2016). Des Moines (IW), USA.
58. *E. Lale, **G. Cusatis**, “Isogeometric Implementation of the High-Order Microplane Model for Softening and Localization”, *9th International Conference on Fracture Mechanics of Concrete and Concrete Structures FraMCoS-9*. May 30–June 1, 2016. V. Saouma, J. Bolander, and E. Landis (Eds). Berkeley (CA), USA. DOI 10.21012/FC9.013.
57. *R. Rezakhani, F. Bousikhane, J. Smith, **G. Cusatis**, “Calibration and Validation of Concrete Model for the Simulation of the Quasi-Static and Dynamic Response of Concrete Structures”, *9th International Conference on Fracture Mechanics of Concrete and Concrete Structures FraMCoS-9*. May 30–June 1, 2016. V. Saouma, J. Bolander, and E. Landis (Eds). Berkeley (CA), USA. DOI 10.21012/FC9.284.
56. *R. Rezakhani, M. Alnaggar, **G. Cusatis**, “Multiscale Analysis of Alkali Silica Reaction in Concrete: A Homogenization Approach”, *9th International Conference on Fracture Mechanics of Concrete and Concrete Structures FraMCoS-9*. May 30–June 1, 2016. V. Saouma, J. Bolander, and E. Landis (Eds). Berkeley (CA), USA. DOI 10.21012/FC9.285.
55. *M. Alnaggar, **G. Cusatis**, “Lattice Discrete Particle Modeling (LDPM) of Flexural Size effect in Over Reinforced Concrete Beams”, *9th International Conference on Fracture Mechanics of Concrete and Concrete Structures FraMCoS-9*. May 30–June 1, 2016. V. Saouma, J. Bolander, and E. Landis (Eds). Berkeley (CA), USA.
54. *J. Podrouzek, J. Vorel, **G. Cusatis**, R. Wendner “Implications of spatial variability characterization in discrete particle models”, *9th International Conference on Fracture Mechanics of Concrete and Concrete Structures*

³Articles with asterisk are in refereed proceedings.

FraMCoS-9. May 30–June 1, 2016. V. Saouma, J. Bolander, and E. Landis (Eds). Berkeley (CA), USA. DOI 10.21012/FC9.274.

53. *C. Ceccato, C Pellegrino, **G Cusatis**. “Lattice Discrete Particle Modeling (LDPM) of Fiber Reinforced Polymers (FRP) confined concrete columns”. *The 12th International Symposium on Fiber Reinforced Polymers for Reinforced Concrete Structures (FRPRCS-12) & The 5th Asia-Pacific Conference on Fiber Reinforced Polymers in Structures (APFIS-2015)*, 14-16 December, 2015. Nanjing, China.
52. M. Abdellatef, M. Alnaggar, G. Boumakis, R. Wendner, **G. Cusatis**, G. Di Luzio. “Lattice Discrete Particle Modeling for coupled concrete creep and shrinkage using Solidification Microprestress Theory”. *Creep, shrinkage and durability of concrete and concrete structures*. (Proceedings of the 10th International Conference CONCREEP-10), 19-20 September, 2015. Vienna, Austria.
51. **G. Cusatis**, M. Alnaggar, P. Gardoni, M. D’Ambrosia, J. Qu. “Aging and deterioration of concrete structures. Learning from the past, assessing the present, and predicting the future: science or magic?”. *Creep, shrinkage and durability of concrete and concrete structures*. (Proceedings of the 10th International Conference CONCREEP-10), 19-20 September, 2015. Vienna, Austria.
50. L. Wan, R. Wendner, **G. Cusatis**. “A Hygro-Thermo-Chemo-Mechanical Model for the Simulation of Early Age Behavior of Ultra High Performance Concrete”. *Creep, shrinkage and durability of concrete and concrete structures*. (Proceedings of the 10th International Conference CONCREEP-10), 19-20 September, 2015. Vienna, Austria.
49. *S. Esna Ashari, G Buscarnera, **G. Cusatis**. “Micro-scale modeling of the inelastic response of a granular sandstone”. *49th US Rock Mechanics / Geomechanics Symposium*, June 28 - July 1, 2015. San Francisco, CA, USA.
48. *W. Li, C Jin, M Salviato, **G. Cusatis**. “Modeling of Failure Behavior of Anisotropic Shale Using Lattice Discrete Particle Model”. *49th US Rock Mechanics / Geomechanics Symposium*, June 28 - July 1, 2015. San Francisco, CA, USA.
47. M. Alnaggar, **G. Cusatis**, J. Qu, M. Liu “Simulating acoustic nonlinearity change in accelerated mortar bar tests: a discrete mesoscale approach”. *IALCEE Conference 2014*, 16-19 November, 2014. Tokyo, Japan.
46. R. Wendner, M. Marcon, J. Vorel, **G. Cusatis**. “Characterization of concrete for fastening systems”. *IALCEE Conference 2014*, 16-19 November, 2014. Tokyo, Japan.
45. **G. Cusatis**, M. Alnaggar , R. Rezakhani. “Multiscale modeling of alkali-silica reaction reaction degradation of concrete”. *RILEM symposium CONMOD 2014*, 12-14 October, 2014. Tsinghua University, Beijing, China.
44. G. Buscarnera, **G. Cusatis**, A. Zubelewicz, Z. P. Bazant. “Shale Fracturing for Energy Recovery: Current Issues and Review of Available Analytical and Computational Models”. *ASCE Shale Energy Engineering Conference*, Pittsburgh, Pennsylvania. July 21-23, 2014.
43. R.G. El-Helou, E. Lale, C.D. Moen, **G. Cusatis**. “Lattice discrete particle modeling of buckling deformation in thin ultra-high-performance fiber-reinforced concrete plates”. *Proceedings of EURO-C 2014, Computational Modelling of Concrete and Concrete Structures*, 24-27 March, 2014. St. Anton, Austria.
42. **G. Cusatis**, R. Rezakhani, M. Alnaggar, Z. Zhou, D Pelessone. “Multiscale computational models for the simulation of concrete materials and structures”. *Proceedings of EURO-C 2014, Computational Modelling of Concrete and Concrete Structures*, 24-27 March, 2014. St. Anton, Austria.
41. *M. Alnaggar, **G. Cusatis** and G.Di Luzio. “A Discrete Model for Alkali-Silica-Reaction in Concrete”. *Proceedings of 8th International Conference on Fracture Mechanics of Concrete and Concrete Structures (FraMCoS-8)*, 10-14 March, 2013. Toledo, Spain.
40. *R. Rezakhani and **G. Cusatis**. “Generalized Mathematical Homogenization of The Lattice Discrete Particle Model”. *Proceedings of 8th International Conference on Fracture Mechanics of Concrete and Concrete Structures (FraMCoS-8)*, 10-14 March, 2013. Toledo, Spain.
39. E. Gal, R. Rezakhani and **G. Cusatis**. “Homogenization of Concrete Using the Lattice Discrete Particle Model (LDPM)”, *Proceedings of IASS-IACM 2012: 7th International Conference on Computational Mechanics for Spatial Structure*, Sarajevo, Bosnia, 2-4 April 2012.
38. *G. Di Luzio, M. Alnaggar and **G. Cusatis**. “Lattice Discrete Particle Modeling of Alkali-Silica-Reaction Effects to Concrete Structures”, *Proceedings of the Numerical Modeling Strategies for Sustainable Concrete Structures-SSCS 2012*, P. Rossi and J.L. Tailhan (eds); Aix en Provence, France, 2012, in CD.

37. *G. Di Luzio and **G. Cusatis**. “Calibration and Validation of a Numerical Model for Early-Age Damage Analysis”, *Proceedings of 2012 Structures Congress - 20th A & C Specialty Track*. 29-31 March, 2012. Chicago (IL).
36. *J. Smith and **G. Cusatis**. “Calibration and Validation of the Lattice Discrete Particle Model for Ultra-High Performance Fiber Reinforced Concrete”, *Proceedings of 2012 Structures Congress - 20th A&C Specialty Track*. 29-31. March 2012. Chicago (IL).
35. *M. Alnaggar and **G. Cusatis**. “Automatic Parameter Identification of Discrete Mesoscale Models with Application to the Coarse-Grained Simulation of Reinforced Concrete Structures.”, *Proceedings of 2012 Structures Congress - 20th A&C Specialty Track*. 29-31. March 2012. Chicago (IL).
34. *E. Schaufert and **G. Cusatis**. “Simulation of the Multiaxial Loading behavior of Fiber Reinforced Concrete”. *Proceedings of Second RILEM International Conference on Strain Hardening Cementitious Composites (SHCC2-Rio)*. 12-14 December, 2011. Rio de Janeiro, Brazil.
33. **G. Cusatis**, M. Savoia, N. Buratti (2011) “Discrete lattice model for fiber reinforced concrete modeling”. *Proceedings of the XX conference of the Italian Association for Theoretical and Applied Mechanics (AIMETA)*, 12-15 Sept. 2011, Bologna, Italy. ISBN: 9788890634017. Web: <http://www.lamc.ing.unibo.it/aimeta2011/indiceM.html>.
32. ***G. Cusatis**, G. Diluzio, and L. Cedolin. “Meso-Scale Simulation of Concrete: Blast and Penetration Effects and AAR Degradation”. *Performance, Protection and Strengthening of Structures under Extreme Loading – Applied Mechanics and Materials*, 2011, 82, pp. 75-80. Trans Tech Publications, Switzerland.
31. **G. Cusatis**, L. Zhang. “Immersed Solid Volume Method for the Analysis of Concrete Dams”. *Proceedings of NSF CMMI Research and Innovation Conference*, 4-7 January, 2011. Atlanta, USA.
30. **G. Cusatis**, L. Zhang, L. Han, D. Pelessone. “Towards the computational analysis of blast-induced debris dynamics”. *Proceedings of International Symposium on Military Aspects of Blast and Shock (MABS21)*. 3-8 October, 2010. Jerusalem, Israel.
29. ***G. Cusatis**, A. Mencarelli, D. Pelessone, and J. T. Baylot. “The Lattice Discrete Particle Model (LDPM) for the simulation of Uniaxial and Multiaxial Behavior of Concrete: Recent Results”. *Proceedings of 7th International Conference on Fracture Mechanics of Concrete and Concrete Structures (FraMCos 7)*, 23-28 May, 2010. Jeju, South Korea.
28. *G. Di Luzio, **G. Cusatis**, and L. Cedolin, “Numerical simulation of heat transfer and moisture transport in high performance concrete at early age”. *Proceedings of 7th International Conference on Fracture Mechanics of Concrete and Concrete Structures (FraMCos 7)*, 23-28 May, 2010. Jeju, South Korea.
27. ***G. Cusatis**, and E. A. Schaufert. “Discontinuous Cell Method (DCM) for Cohesive Fracture Propagation”. *Proceedings of 7th International Conference on Fracture Mechanics of Concrete and Concrete Structures (FraMCos 7)*, 23-28 May, 2010. Jeju, South Korea.
26. *Z. P. Bažant, **G. Cusatis**, Q. Yu, L. Cedolin, and M. Jirasek, “Misconceptions on Variability of Fracture Energy, Its Uniaxial Definition by Work of Fracture, and Dependence on Crack Length and Specimen Size”. *Proceedings of 7th International Conference on Fracture Mechanics of Concrete and Concrete Structures (FraMCos 7)*, 23-28 May, 2010. Jeju, South Korea.
25. **G. Di Luzio**, G. Cusatis, and L. Cedolin, “A numerical model for early age concrete behavior”. EURO-C 2010: Computational Modeling of Concrete Structures. March 15-18, 2010. Rohrmoos/Schladming, Austria.
24. **G. Cusatis**, E. A. Schaufert, D. Pelessone, J. L. O’Daniel, P. Marangi, M. Stacchini, and M. Savoia. “Lattice Discrete Particle Model for Fiber Reinforced Concrete (LDPM-F) with Application to the Numerical Simulation of Armoring Systems”. *Proceedings of EURO-C 2010: Computational Modeling of Concrete Structures*. March 15-18, 2010. Rohrmoos/Schladming, Austria.
23. Z. P. Bažant, Q. Yu, F. Caner, and **G. Cusatis**. “How to enforce non-negative energy dissipation in microplane and other constitutive models for softening damage, plasticity and friction”. *Proceedings of EURO-C 2010: Computational Modeling of Concrete Structures*. March 15-18, 2010. Rohrmoos/Schladming, Austria.
22. Z. P. Bažant, Q. Yu, G.-H. Li, and **G. Cusatis**. “Modeling of Creep and Hygrothermal Deformations of Concrete, and Consequences of Nano-Porosity”. *Proceedings of the Fourth Biot Conference on Poromechanics*. Columbia University, New York City, NY. June 8-10, 2009.

21. **G. Cusatis**, A. Mencarelli, D. Pelessone, and J. Bishop. “On the Meso-Scale Simulation of Blast and Penetration Effects on Structures”. *Electronic Proceedings (CD) of the International Symposium on the Interaction of the Effects of Munitions with Structures (ISIEMS) 13*. 11-15 May 2009. Bruhel, Germany.
20. **G. Cusatis**, A. Mencarelli, and D. Pelessone. “Mesoscale Modeling of Debris Generation in Reinforced Concrete Structures”. *Proceedings of the Inaugural International Conference of the Engineering Mechanics Institute (EM08)*, University of Minnesota, Minneapolis, Minnesota, May 18-21, 2008.
19. E. A. Schaufert and **G. Cusatis**. “Cohesive Fracture and the Effective Fracture Process Zone Length”. *Proceedings of the Inaugural International Conference of the Engineering Mechanics Institute (EM08)*, University of Minnesota, Minneapolis, Minnesota, May 18-21, 2008.
18. **G. Cusatis**, D. Pelessone, and J. T. Baylot. “Dynamic Pull-out Test Simulations Using the Lattice Discrete Particle Model (LDPM)”. *Proceedings of the 2008 ASCE Structures Congress*, April 24-26, 2008, Vancouver, Canada.
17. **G. Cusatis**, A. Mencarelli, D. Pelessone, and J. T. Baylot. “Lattice Discrete Particle Model (LDPM) for Fracture Dynamics and Rate Effect in Concrete”. *Proceedings of the 2008 ASCE Structures Congress*, April 24-26, 2008, Vancouver, Canada.
16. **G. Cusatis**, D. Pelessone, A. Mencarelli, and J. T. Baylot. “Simulation of Reinforced Concrete Structures Under Blast And Penetration Through Lattice Discrete Particle Modeling”. *Electronic Proceedings (CD) of IMECE 2007 - ASME International Mechanical Engineering Conferences & Exposition*, November 11-15, 2007, Seattle, USA.
15. D. Pelessone, **G. Cusatis**, and J. T. Baylot. “Application of the Lattice Discrete Particle Model (LDPM) to Simulate the Effects of Munitions on Reinforced Concrete Structures”. *Electronic Proceedings (CD) of the International Symposium on the Interaction of the Effects of Munitions with Structures (ISIEMS) 12.1*, September 17-21, 2007, Orlando, FL, USA.
14. **G. Cusatis**, A. Mencarelli, D. Pelessone, and J. T. Baylot. “Lattice Discrete Particle Model (LDPM): Formulation, Calibration, and Validation”. *Electronic Proceedings (CD) of the International Symposium on the Interaction of the Effects of Munitions with Structures (ISIEMS) 12.1*, September 17-21, 2007, Orlando, FL, USA.
13. *L. Cedolin and **G. Cusatis**. “Cohesive fracture and size effect in concrete”. *Fracture Mechanics of Concrete and Concrete Structures. Volume 1: New Trends in Fracture Mechanics of Concrete* (Proceedings of the Sixth International Conference on Fracture Mechanics of Concrete and Concrete Structures - FraMCoS-6). Catania, Italy. June 18-21, 2007. ISBN 978-0-415-44065-3. pp. 17-29.
12. **G. Cusatis** and Z.P. Bažant. “Size effect on compression fracture of concrete with or without V-notches: a numerical meso-mechanical study”. *Proceedings of the EURO-C 2006 Conference on Computational Modelling of Concrete Structures*, 27-30 March 2006, Mayrhofen, Tyrol, Austria. ISBN 10: 0 415 39749 9. pp. 71-76.
11. P. Grassl, Z.P. Bažant, and **G. Cusatis**. “Lattice-cell approach for modeling fracture”. *Proceedings of the EURO-C 2006 Conference on Computational Modelling of Concrete Structures*, 27-30 March 2006, Mayrhofen, Tyrol, Austria. ISBN 10: 0 415 39749 9. pp. 263-268.
10. **G. Cusatis** and D. Pelessone “Mesolevel simulation of reinforced concrete structures under impact loadings”. *Proceedings of the EURO-C 2006 Conference on Computational Modelling of Concrete Structures*, 27-30 March 2006, Mayrhofen, Tyrol, Austria. ISBN 10: 0 415 39749 9. pp. 63-70.
9. L. Cedolin, **G. Cusatis**, S. Eccheli, and M. Roveda. “On the failure envelope of reinforced concrete cross sections subjected to biaxial bending and axial load: an analytical solution”. *Electronic Proceedings (CD) of the Second FIB Congress*, 5-8 June 2006, Naples, Italy.
8. Z.P. Bažant, and **G. Cusatis**. “Concrete creep at high temperature and its interaction with fracture: recent progress”. *Creep, shrinkage and durability of concrete and concrete structures*. (Proceedings of the 7th International Conference CONCREEP-7), Nantes, France, 12-14 September 2005. Pijaudier-Cabot Gilles, Gerard Bruno, and Acker Paul eds., pp. 449-459.
7. Z.P. Bažant, and **G. Cusatis**. “Creep diffusion and fracture in heated concrete structures: recent progress”. *Proceedings of the 6th International Congress on Thermal Stresses*. 26-29 May 2005, Vienna, Austria. F. Ziegler, R. Heuer, C. Adam, eds, Vienna University of Technology, Austria, pp. 15-22.

6. ***G. Cusatis**, M. Polli and L. Cedolin. “Mesolevel analysis of fracture tests for concrete”. *Fracture Mechanics of Concrete Structures* (Proceedings of the Fifth International Conference on Fracture Mechanics of Concrete and Concrete Structures - FraMCoS-5). Vail Cascade Resort, Vail Colorado, USA. V.C. Li, C.K.Y. Leung, K.J. Willam, S.L. Billington, ed., Ia-FraMCoS, USA, April 2004. ISBN 0-87031-135-2, pp. 345-351.
5. *Z.P. Bažant, F.C. Caner, L. Cedolin, **G. Cusatis** and G. Di Luzio. “Fracturing Material Models Based on Micromechanical Concepts: Recent Advances”. *Fracture Mechanics of Concrete Structures* (Proceedings of the Fifth International Conference on Fracture Mechanics of Concrete and Concrete Structures - FraMCoS-5). Vail Cascade Resort, Vail Colorado, USA, April 2004. V.C. Li, C.K.Y. Leung, K.J. Willam, S.L. Billington, ed., Ia-FraMCoS, USA, ISBN 0-87031-135-2, pp. 83-89.
4. *G. Di Luzio and **G. Cusatis**. “A New Constitutive Model for Concrete-Steel Bond Behavior”. *Computational Modeling of Concrete Structures* (Proceedings of the EURO-C 2003 Conference). St. Johann im Pongau, Austria, March, 2003. N. Bićanić, R. de Borst, H. Mang, G. Meschke, ed., A.A. Balkema, The Netherlands, ISBN 9058095363, pp. 281-286.
3. ***G. Cusatis**, G. Di Luzio and M. Rota. “Simulation of Headed Anchor Failure”. *Computational Modeling of Concrete Structures* (Proceedings of the EURO-C 2003 Conference). St. Johann im Pongau, Austria, March 2003. N. Bićanić, R. de Borst, H. Mang, G. Meschke, ed., A.A. Balkema, The Netherlands, ISBN 9058095363, pp. 683-688.
2. ***G. Cusatis**, Z.P. Bažant and L. Cedolin. “3D Lattice model for dynamic simulations of creep, fracturing and rate effect in concrete”. *Creep, shrinkage and durability mechanics of concrete and other quasi-brittle materials* (Proceedings of the 6th International Conference CONCREEP-6, MIT, Cambridge (MA), USA, August 2001. F.-J. Ulm, Z.P. Bažant and F.H. Wittmann, eds., Elsevier, Amsterdam, ISBN 0080440029, pp. 113-118.
1. *Z.P. Bažant, L. Cedolin and **G. Cusatis**. “Temperature effect on concrete creep modeled by Microprestressing-Solidification theory”. *Creep, shrinkage and durability mechanics of concrete and other quasi-brittle materials* (Proceedings of the 6th International Conference CONCREEP-6, MIT, Cambridge (MA), USA, August 2001. F.-J. Ulm, Z.P. Bažant and F.H. Wittmann, ed., Elsevier, Amsterdam, ISBN 0080440029, pp. 197-204

:: RESEARCH – PROJECTS ::

Externally Sponsored @ Northwestern University

10. Simulation of Concrete 3D Printing, 9/17-9/19, USACE ERDC via ES3.
9. Aging Micromechanical Models for Concrete, 8/17-8/18, USACE ERDC via ES3.
8. Characterization of aging behavior in Cor-Tuf. 12/15-12/16, USACE ERDC via ES3.
7. Multiscale and Multiphysics Simulation of Reinforced Concrete Structures. 9/14-9/17, NSF.
6. 3D Braided Composite Structures - Experimental Characterization and Modeling of Fracturing Behavior. 9/14-9/17, NSF.
5. Service Lifetime Extension of Nuclear Power Plants: Prediction of Concrete Aging and Deterioration Through Accelerated Tests, Nondestructive Evaluation, and Stochastic Multiscale Computations. 9/14-9/17, NRC.
4. Microplane Constitutive Model for Carbon-Polymer Laminates and Prediction of Car Crashworthiness. 12/12-12/14, DOE via USCAR.
3. Ultra-High Performance Fiber Reinforced Concrete Structures - Macroscale Analysis with Mesoscale Lattice Discrete Particle Models. 8/12-7/15, NSF.
2. Microscopic Computational Simulation of Fiber-Matrix Interaction in Ultra High-Performance Cementitious Composites Under Quasi-Static and Dynamic Loadings. 8/12-8/13. USACE ERDC.
1. Numerical Simulation of the Micromechanical Behavior of Fiber/Concrete Interaction. 10/12-10/14. USACE ERDC via ES3 SBIR Phase II Project.

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9. High Strain Rate Behavior of Dam Concrete: Experiments and Multiscale Modeling. 4/10-4/12. DHS.
8. Mesoscale Based Formulation of Microplane Model. 8/09-8/11. USACE ERDC.
7. Man-made Hazard Mitigation of Reservoir Dams: Monte Carlo Simulation with Multiscale Modeling of Concrete and Accurate Fluid-Structure Interaction. 7/09-7/12. NSF.

6. A Multiscale Multiphysics Computational Framework for the Simulation of Blast Induced Pervasive Failure. 4/09-4/12 DTRA.
5. An Adaptive Multiscale Framework for the Simulation of Fiber-Reinforced High-Performance Concrete Subjected to High Speed Penetration. 9/08-9/09. USACE ERDC via ES3.
4. Microplane Modeling of Size-Effect in Composite Laminates. 5/08-9/08. ONR via Northwestern University.
3. Microplane Model for Stochastic Heterogeneous Quasi-Brittle Media. 5/08-9/08. NSF via Northwestern University.
2. Mesoscale and Macroscale Approaches for the Simulation of Quasi-Brittle Fracture. 4/8/08. Sandia National Lab.
1. Constitutive Modeling and Numerical Algorithms for Concrete Behavior at High Strain Rate. 10/05-8/07. USACE ERDC via ES3.

Seed and Startup Funds @ Northwestern University

4. Energy recovery and fracture in granular rocks: towards a new generation of multi-scale simulators, ISEN, 7/13-6/14.
3. Fungi-Activated Self-Healing Cement Paste for Sustainable Civil Engineering Infrastructure Materials, CEE, 4/13- 4/14.
2. Bridging Scale Method formulation for the Simulation of Penetration into Concrete Structures, Start-up, 5/12-12/12.
1. Characterization of the Mechanical Behavior of CorTuf Concrete at Early-Age and Beyond, Start-up. 9/12-9/13.

Seed and Startup Funds @ Rensselaer Polytechnic Institute

4. Discontinuous Cell Method (DCM). Start-up, 9/07-12/09.
3. Spectral Particle Method (SPM). Start-up, 1/06-8/07.
2. Lattice Discrete Particle Model (LDPM) for Concrete. Start-up, 1/06-8/09.
1. Size Effect and Cohesive Crack Propagation in Quasi-Brittle Materials. Start-up, 1/06-1/08.

:: TEACHING AND SUPERVISING ::

@ Northwestern University

Graduate Courses: (4) Inelastic Analysis of Structures – Fall 2017; (3) Theory of Elasticity – Winter 2013-Winter 2017; (2) Theory of Plates and Shells – Spring 2012, Winter 2013-Present; (1) Prestressed Concrete – Spring 2012-Present.

Post-Docs: (6) Roozbeh Rezaekhani September 2016 – Present. (5) Marco Salviato, January 2014 – July 2015. (4) Erol Lale, September 2013 – August 2015; (3) Congrui Jin, October 2013 – August 2015; (2) Roman Wendner, July 2012 – August 2013; (1) Xinwei Zhou, May 2012 – February 2013.

PhD Students: (11) Matthew Troemner, “TBD”, in progress. (10) Elham Ramyar, “TBD”, in progress. (9) Chenyang Li, “TBD”, in progress. (8) Madura Pathirage, “Experimental and Numerical Modeling of Concrete Deterioration and Aging (tentative)”, In progress. (7) Faysal Bousikhane, “Experimental and Numerical Modeling of Concrete Deterioration and Aging (tentative)”, In progress. (6) Weixin Li, “Computational Modeling of the Fracturing Behavior of Anisotropic Materials”, In progress. (5) Lin Wan, “Material Characterization and Aging of Ultra-High Performance Concrete” December 2015, (4) Shiva Esna Ashari Esfahani, “Multiscale Modeling of Earth-like Materials”, July 2016; (3) Jovanca Smith, “Characterization of Ultra-High Performance Concrete for Impact Resistant Structures”, May 2014; (2) Roozbeh Rezhakani, “Mathematical Homogenization of Discrete Models for the Simulation of Quasi-Brittle Behavior”, September 2016; (1) Mohammed Al-Naggar, “Multiscale Modeling of Concrete for Failure Analysis and Aging of Concrete Structures”, May 2014.

MS Students: (10) Zixian Yang, in progress. (9) Zhefei Jin, “Experimental Study of Marcellus Shale”, September 2016. (8) Minhyeok Ko “Shrinkage and Creep Effect on Large Structures”, May 2016. (7) Oluwatobi Fiyin, “Shrinkage and Creep Effect on Tall Building”, May 2015. (6) Mengxi Du, “Experimental Investigation of Fiber Reinforced Ultra High Performance Concrete”, May 2015. (5) Madura Pathirage, “Alkali Silica Deterioration of Concrete”, August 2015. (4) Faysal Bousikhane, “Experimental investigation of a fungi-activated self-healing concrete”, July 2014; (3) Jiannan Wang, “Computational Analysis of Concrete-Fiber Interaction”, March 2014; (2) Yikai Wang,

“Strength and Toughness Build-Up of Ultra-High Performance Concrete”, December 2013; (1) Laure Bonfils, “Dynamic Behavior of Ultra-High Performance Concrete (UHPC) Structures Under Extreme Loading Conditions”, May 2013.

@ Rensselaer Polytechnic Institute

Graduate Courses: (1) Advanced Concrete Mechanics – Fall 2008, 2010;

Undergraduate Courses: (4) Strength of Materials – Fall 2010; (3) Concrete Design – Spring 2007, Spring 2011-2009; (2) Advanced Structural Analysis – Spring 2006, 2008, 2010; (1) Introduction to Structural Engineering in Fall 2009-2005.

Post-Docs: (2) Andrea Mencarelli, November 2010 – December 2010; (1) Edward Schauffert, September 2010 – August 2011.

PhD Students: (3) Xinwei Zhou, “Continuous/Discrete Computational Modeling for the Multiscale Simulation of Concrete Mechanical Behavior”, May 2012; (2) Andrea Mencarelli, “Numerical Simulation of the Effect of Blast and Penetration on Reinforced Concrete Structures”, November 2010; (1) Edward A. Schauffert, “Discrete Modeling of Quasi-Brittle Materials: Fracture, Fragmentation and Size-Effect”, August 2010.

MS Students: (7) Eric Domonell, “Lattice Discrete Particle Modeling of Reinforced Concrete”, December 2011. (6) Jovanca Smith, “Discrete Modeling of Ultra High-Strength, Fiber Reinforced Concrete”, August 2011. (5) Eric Dhal, “Experimental Investigation of the Mechanical Behavior of Concrete under Uniaxial and Multiaxial Stress States”, November 2009. (4) Daniel Horvath, “Microplane Modeling of Concrete and Other Quasi-Brittle Materials”, November 2009. (3) Andrea Mencarelli “Discrete Particle Model (LDPM) for Concrete: Calibration and Validation under Quasi-Static Loading Condition”, December 2007. (2) Edward Schauffert, “Size Effect and Cohesive Crack Propagation in Quasi-Brittle Materials”, August 2007. (1) Miao Zhou “Spectral Particle Method (SPM) for Two-dimensional Cohesive Crack Propagation”, August 2007.

Short Courses

7. “Multi-Scale and Multi-Phase Modeling of Aging Concrete Structures”, BOKU University, Vienna (Austria), July 2014 and June 2015.
6. “Microplane Models: Theory, Numerical Implementation, and Applications”, Monash University, Melbourne (Australia), May 2014.
5. “MARS: Multiscale Modeling of Concrete”, ES3 Headquarters, San Diego (CA), USA, April 2014.
4. “MARS: Modeling and Analysis of the Response of Structures”. Rensselaer Polytechnic Institute, Troy (NY), USA, September 2010.
3. “Cracking of Prestressed Concrete Bridges”. NYSDOT. Bridge Inspection Training Course. Birch Hill, Schodack, NY, March 2010.
2. “Design of Prestressed Concrete Bridges”. NYSDOT Training Course. Rensselaer Polytechnic Institute, Troy (NY), USA, May 2007.
1. “Modeling and Analysis of the Response of Structures (MARS) Workshop: the Lattice Discrete Particle Model (LDPM)”. U.S. Army Engineer Research & Development Center, Vicksburg (MS), USA, April 2007.

:: SERVICE AND LEADERSHIP ::

Membership in Professional Societies

- American Society of Civil Engineering (ASCE), Member, August 2006 – Present.
- American Concrete Institute (ACI), Member, August 2005 – Present.
- International Association of Protective Structures (IAPS), September 2011 – 2014.
- RILEM, International Union of Laboratories and Experts in Construction Materials, Systems and Structures, Member, May 2010 – May 2012.
- United States Association for Computational Mechanics (USACM), Member, August 2009 – August 2010.
- The Milan Order of Engineers, Member, 1999 – 2006.

Service in Technical Committees and Technical Boards – Associations

- IA-ConCreep, Board of Directors, President, October 2015 - Present.
- IA-FraMCoS (Fracture Mechanics of Concrete and Concrete Structures), Treasurer, March 2013 – Present.
- ACI 209, Creep and Shrinkage in Concrete, Member since May 2008. Chair, April 2016 – Present.

- ACI 446 Fracture Mechanics, Member since September 2005. Chair, March 2010 – March 2016.
- ACI Committee on Awards for Papers (CAP) – Subcommittee SC2, Wason Medal for Materials Research, Member, February 2013 – Present.
- ACI 447 Finite Element Analysis of Reinforced Concrete Structures (Joint ACI-ASCE), Member since April 2008.
- ASCE EMI – Computational Mechanics, Member, April 2008 – Present.
- ASCE EMI – Modeling Inelasticity and Multi-Scale Behavior, Member, May 2008 – Present. – Present.
- IA-ConCreep, Board of Directors, Secretary, October 2008 - September 2012.

Service in Technical Committees and Technical Boards – Journals

- Associate Editor for the J. of Nanomechanics and Micromechanics (JNM) of ASCE. September 2014 – Present.
- Editorial Advisor Board of the International Journal of Damage Mechanics. February 2014 – Present.
- Editorial Board of the Int. J. for Numerical and Analytical Methods in Geomechanics. October 2013 – Present.
- Associate Editor for the Engineering Mechanics Journal (JEM) of the ASCE. December 2012 – Present.

Chairmanship at Conferences and Workshops

- EMI 2013, ASCE Engineering Mechanics Institute Conference, 4-7 August, 2013, Evanston (IL), USA. Conference Chair.
- SES 2012, Society of Engineering Science, 49th Annual Technical Meeting, 10-12 Oct, 2012, Atlanta (GA), USA. “Symposium IV.15 From Nanopores to Large Structures: A Life Time Journey Across Length Scales”. In honor of Prof. Z.P. Bažant. Organizer and Session Chairman.
- EMI 2010, ASCE Engineering Mechanics Institute Conference, 8-11 August, 2010, Los Angeles (CA), USA. Mini-symposium on “Constitutive and Fracturing Behavior of Quasi-Brittle Materials Computation and Experiments” in honor of Prof. L. Cedolin. Organizer and Session Chairman.
- 7th International Conference on Fracture Mechanics of Concrete and Concrete Structures (FramCos 7), 23-28 May, 2010, Jeju, South Korea. Two sessions on “Discrete Modeling of Concrete Materials and Structures”, Session Organizer and Session Chairman.
- 10th U.S. National Congress for Computational Mechanics, Mini-symposium on Structural Response Under Extreme Loads: Modeling, Simulation, and Experiments, Columbus (OH), July 16-19, 2009, Session Organizer and Session Chairman.
- The 2009 Joint ASCE-ASME-SES Conference on Mechanics and Materials, Symposium in Honor of Z. P. Bažant, Blacksburg (VA), June 24-27, 2009, Session Chairman.
- Mini-symposium on Failure Simulation by Discrete Models, CFRAC 2007, International Conference on Computational Fracture and Failure of Materials and Structures, Nantes, France, June 11 – 13, 2007, Session Chairman.

Service @ Northwestern University

- Area Coordinator for the Mechanics, Materials, and Structures (MMS) program. January 2015 – Present.
- CEE Graduate committee, CEE Department, February 2014 – Present.
- CEE Space Committee, CEE Department, February 2014 - Present.
- Faculty Advisory Committee, CEE Department, September 2013 – Present.
- Coordinator for the Seminar Series on “Sustainable Engineering of Geological and Infrastructure Materials (SEGIM)”, September 2014 – Present.
- Coordinator for the Seminar Series on “Structural Engineering and Infrastructure Materials (SEIM): Design, Mechanics, and History”. August 2012 – August 2014.
- Area Coordinator for the Structural Engineering and Infrastructure Materials (SEIM) program. August 2011 – December 2014.
- ME Computational Mechanics Search Committee, Member, September 2013 – May 2014.

Service @ Rensselaer Polytechnic Institute

- Geotechnical/Environmental Engineering Search Committee, Member, January 11 – May 11.
- CEE Graduate Committee, Member, September 2008 – May 2011.
- 175th Anniversary Celebration Committee, Member, September 2009 – May 2010.
- Faculty Peer Support Committee, Member, Sep.ember 2008 – Sep. 2009.
- Faculty Mentorship Committee, Chair, January 2008 – September 2008.
- Departmental Undergraduate Committee, Member, January 2008 – Sept. 2008.
- Faculty advisor for the Chi-Epsilon Student Chapter, May 2010 – May 2011.
- Advisor for the RPI Concrete Canoe Team, Fall 2010 – Spring 2011.
- Advisor for the RPI Steel Bridge Team, Fall 2006 – Spring 2011.

:: PROFESSIONAL AND PUBLIC LECTURES ::

Plenary and Keynote Lectures

8. “The Lattice Discrete Particle Model (LDPM) for Fracture Dynamics and Rate Effect in Concrete: Theory, Calibration and Applications” Plenary lecture at the 22th DYMAT Technical Meeting. Grenoble, France. October 19-21, 2016.
7. “A Computational Framework for the Simulation of Aging and Deterioration of Concrete Structures” Plenary Lecture at the 57th Brazilian Conference of Concrete. Bonito (MS), Brazil. October 27-30, 2015.
6. “Aging and deterioration of concrete structures. Learning from the past, assessing the present, and predicting the future: science or magic?” Plenary Lecture at the 10th International Conference on Mechanics and Physics of Creep, Shrinkage, and Durability of Concrete and Concrete Structures (CONCREEP-10). Vienna, Austria. September 21-23, 2015.
5. “Mesoscale Simulation of Alkali-Silica Reaction (ASR) Deterioration of Concrete and Interpretation of Nonlinear Ultrasound Measurements” Keynote Lecture at NEA-CSNI-IAGE CAPS Workshop: Assessment of Nuclear Structures Subject to Concrete Degradation (ASCET). Gaithersburg, MD, June 30, 2015.
4. “Multiscale computational models for the simulation of concrete materials and structures” Plenary Lecture at EURO-C 2014, 24-27 March, 2014. St. Anton, Austria.
3. “High-order Microplane Theory for Elasticity and Softening of Quasi-Brittle Materials” Keynote Lecture at The Third International Conference on Computational Modeling of Fracture and Failure of Materials and Structures (C-FRAC 2013), Prague, Czech Republic, 4-7 June 2013.
2. “Simulation of Fiber-Reinforced Ultra-High Performance Concrete Under Penetration” Keynote Lecture at the PREVI Workshop, Les Houches, France, 1-4 April, 2013.
1. “Generalized Mathematical Homogenization of The Lattice Discrete Particle Model”. Keynote Lecture at the 8th International Conference on Fracture Mechanics of Concrete and Concrete Structures (FramCos-8), 10-14 March, 2013. Toledo, Spain.

Selected Invited Lectures (15 out of 50⁺)

15. “Discrete Modeling of Mesoscale Poromechanics: Formulation and Numerical Examples with Application to Shale Simulation.”, Politecnico di Milano, Milan, Italy. June 6, 2017.
14. “Multiscale-Multiphysics Computational Models for Quasi-Brittle Materials: from Cementitious and Carbon Composites to Rock and martian Concrete.”, Laval University, Quebec, Canada. May 10, 2017.
13. “Aging and deterioration of infrastructure materials. Learning from the past, assessing the present, and predicting the future: science or magic?” Falling Apart - America’s Neglected Infrastructure, Alumni Association, Northwestern University, Evanston (IL), November 5, 2015.
12. “Multiscale Modeling of the Mechanical Behavior of Black Shale”, Grand Challenges in Geological Fluid Mechanics, Santa Fe (NM), September 4, 2015.
11. “A multiscale computational framework for the Alkali Silica Reaction (ASR) deterioration of concrete structures”, NIST, Gaithersburg (MD), April 7, 2015
10. “Aging and deterioration of concrete structures. Learning from the past, assessing the present, and predicting the future”, University of Illinois at Urbana-Champaign, Urbana-Champaign (IL), March 16, 2014.
9. “The Lattice Discrete Particle Model (LDPM): From Concrete Micro-Structure to Structural Modeling of High Impulsive Loading Events”, Tongji University (Shanghai, China), Nanjing University of Science and Technology (Nanjing, China), Tsinghua University and Beihang University (Beijing, China), October 2014.
8. “Multiscale Computational Models for the Simulation of Concrete Materials and Structures” John’s Hopkins University, Baltimore (VA), April 2014 also presented at Monash University and Swinburne University (Melbourne, Australia); University of Sydney and New South Wales (Sydney, Australia), May 2014.
7. “A multiscale computational framework for the analysis of alkali-silica reaction (ASR) deterioration of concrete structures” in Lecture Series 2013-2014 on Life-Cycle and Sustainability of Civil Infrastructure and Protection Systems. BOKU, Vienna (Austria), Mar 2014.
6. “The Lattice Discrete Particle Model (LDPM): From Concrete Micro-Structure to Structural Modeling – A Journey Across Length Scales.” Hilti Corporation, Schaan, Lichtenstein, June 3 2013.

5. "Multiscale Modeling of Concrete (and Other Geomaterials): Are We There Yet?". Sandia Nat Labs, Albuquerque (NM), Sep. 5 2012.
4. "Multiscale And Multiphysics behavior of Concrete: Predicting Infrastructure Future?" US Bureau of Reclamation, Denver (CO), July 20, 2012.
3. "Modeling the Multiscale and Multiphysics Behavior of Concrete: From Academia to Practice", CTL Group, Skokie (IL), April 2012.
2. "Discrete Modeling of Fiber Reinforced Concrete: Current Status and Future Outlook", Structural Mechanics Seminar, Departments of Civil and Mechanical Engineering, University of Maine, USA, Feb 2011.
1. "Lattice Discrete Particle Model for Fiber Reinforced Concrete (LDFM-F)", Politecnico di Milano, Milan, Italy, Dec. 2009.)

Selected Presentations at National and International Conferences, Symposia, and Workshops (15 out of 50⁺)

15. "Simulation of coupled creep, drying, shrinkage and aging of concrete: model complexity and uniqueness of parameter identification", ACI Fall Convention 2017, Anaheim (CA), October 17, 2017.
14. "Fracture and Damage of Textile Composites", 3rd International Conference on Mechanics of Composites (MECHCOMP3), Bologna, Italy. 4-7 July, 2017.
13. "Size-effect Experiments for Characterization of Fracture Properties of Composites", 3rd International Conference on Mechanics of Composites (MECHCOMP3), Bologna, Italy. 4-7 July, 2017.
12. "Effect of Alkali Silica reaction on Aging Mortar Bars.", EMI International Conference 2017, Rio De Janeiro, Brazil. march 22, 2017.
11. "Isogeometric Implementation of The High-Order Microplane Model For Softening And Localization", 9th International Conference on Fracture Mechanics of Concrete and Concrete Structures (FraMCos-9). Berkeley, CA (USA). May 30, 2016.
10. "Multiscale Modeling of Alkali Silica Reaction Deterioration of Concrete Structures", 1st Zdeněk P. Bažant (ZPB) FraMCoS Workshop. Berkeley, CA (USA). May 29, 2016.
9. "Cohesive crack analysis of size-effect for samples with blunt and sharp notches", EMI 2016 Conference, Nashville, TN (USA). May 25, 2016.
8. "Isogeometric Implementation of the High-order Microplane Model for Softening and Localization", C-FRAC 2015 Conference, Cachan (France), 3-5 June 2015.
7. "Simulating acoustic nonlinearity change in accelerated mortar bar tests: a discrete mesoscale approach". IALCEE Conference 2014, Tokyo, Japan, 16-19 November, 2014.
6. "Multiscale modeling of alkali-silica reaction degradation of concrete" RILEM CONMOD 2014, Beijing, China, Oct. 2014.
5. "Multiscale Modeling of Projectile Penetration Into Concrete Targets", 14th International Symposium on Interaction of Munitions with Structures (ISIEMS). Seattle, Washington (USA), Sep. 2011.
4. "Myth and Reality of Multiscale Modeling of Concrete and other Quasi-Brittle Materials", 14th International Symposium on Interaction of Munitions with Structures (ISIEMS). Seattle, Washington (USA), Sep. 2011.
3. "Discontinuous Cell Method (DCM) for Cohesive Fracture Propagation". 7th International Conference on Fracture Mechanics of Concrete and Concrete Structures (FraMCos 7), Jeju, South Korea, May 2010.
2. "Meso-scale Modeling of Blast and Penetration Induced Fragmentation". Particles 2009 International Conference on Particle-Based Methods. Barcelona, Spain, Nov. 2009.
1. "Microplane Model for Composite Laminates", International Conference on Modelling of Heterogeneous Materials with Applications in Construction and Biomedical Engineering, Prague, Czech Republic, June 2007.