

LECTURES OF ZDENĚK P. BAŽANT

November 18, 2017

A. Plenary Conference Lectures

1. Endochronic and classical theories of plasticity in finite element analysis, Int. Conf. on Finite Elements in Nonlinear Solid and Structural Analysis, org. by Tech. Univ. of Norway and Chalmers Univ., Geilo, Norway, Aug. 29, 1977, Principal lecture.

2. Thermal effects, creep and nonlinear response of concrete reactor vessels, General Lecture, Conf. on Struct. Analysis, Design, and Construction of Nuclear Power Plants, Porto Alegre, Brazil, April 18, 1978.

3. Endochronic models for soils, Int. Symp. on Soils under Cyclic and Transient Loading, U. of Wales, Swansea, U.K., January 1980, Principal Lecture.

4. Recent progress in constitutive relations for concrete creep, Int. Conf. on Fundamental Research in Creep and Shrinkage in Concrete, Lausanne, Sept. 16, 1980, Principal Lecture.

5. Inelasticity and fracture in concrete, Int. Conf. on Mechanics of Structured Media, Carlton U., Ottawa, Canada, May 1981, Keynote plenary lecture.

6. Advances in deformation and failure models for concrete, IABSE (Int. Assoc. for Bridge and Structural Eng.) Int. Symp. on Advanced Mechanics of Reinforced Concrete, Delft, Netherlands, June 1981, Plenary Lecture.

7. Crack band model for fracture of geomaterials, 4th Intern. Conf. on Num. Methods in Geomechanics, Edmonton, Canada, June 3, 1982, Principal Lecture.

8. Crack band propagation and fracture of geomaterials modeled by stress-strain relations, International Conf. of Soil Mechanics: Past, Present and Future, Commemorative 25th Anniversary Reunion, Mexico City, Aug. 2, 1982, Invited General Lecture.

9. Concrete reactor vessels: Recent developments, problems and trends, Principal Plenary Lecture of Division H, 7th Intern. Conf. on Struct. Mech., in Reactor Technology, Marriott Hotel, Chicago, Aug. 23, 1983.

10. Mechanics of distributed cracking, Sectional Lecture, Joint ASCE-ASME Mechanics Conference, U. of New Mexico, Albuquerque, June 24, 1985.

11. Modeling of distributed damage by nonlocal continuum with local strain, General Lecture, 4th Int. Conf. on Numerical Methods in Fracture

Mechanics, Plenary Lecture. San Antonio, Texas, March 24, 1987.

12. Nonstationary long-time processes causing loss of serviceability, IABSE Intern. Colloq. on Computational Mechanics of Concrete Structures, Delft, The Netherlands, Aug. 27, 1987, Theme 3 Plenary Lecture.

13. Localization of damage, Keynote Plenary Lecture at Third International Symposium on Numerical Models in Geomechanics (NUMOG III), Niagara Falls, Canada, May 9, 1989.

14. Advances in material modeling of concrete, Plenary Division H Principal Lecture, 10th International Conference on Structural Mechanics in Reactor Technology, Anaheim Hilton, Anaheim, California, August 16, 1989.

15. Determination of Nonlinear fracture characteristics and time dependence from size effect (co-author: R. Gettu), Int. Conf. on "Recent Developments on the Fracture of Concrete and Rocks", Keynote Lecture, University of Wales, Cardiff, September 22, 1989.

16. Random Particle Model for Aggregates and Fiber Composites, Principal Plenary Lecture, Third International Conference on Numerical Methods in Engineering (NUMETA), Swansea, U.K., Jan. 8, 1990.

17. Recent advances in failure localization and nonlocal models, Int. Conf. on Micromechanics of Failure of Quasi-Brittle Materials, Albuquerque (Hilton), June 6, 1990.

18. Size effects of fracture and localization: aperçu of recent advances and their extension to simultaneous fatigue and rate sensitivity. Plenary Lecture, Int. Conference on Fracture Processes in Brittle Disordered Materials (org. by J. van Mier), Noordwijk, the Netherlands, June 20, 1991.

19. Fracture mechanics of concrete: an aperçu of basic conceptual models (co-author V.S. Gopalaratnam). Opening Plenary Lecture, First Int. Conference on Fracture Mechanics of Concrete Structures (FraMCoS 1), Breckenridge, Colorado, June 1, 1992.

20. Fracture size effect and concrete design code. Plenary Closing Lecture, Comett "Fracture of Concrete", Madrid, Spain, November 27, 1992.

21. Time-dependence on fracture and fatigue in concrete and rock, Medal Lecture. Lecture (in

Czech) presented after the conferral of the Medal of Merit for Advances in Mechanics. Annual Meeting, Czech Society for Mechanics, held at Techn. Univ. Prague, February 1, 1993.

22. Current status and advances in the theory of creep and interaction with fracture. Plenary Keynote Lecture, ConCreep 5 (5th RILEM International Symposium on Creep and Shrinkage of Concrete), Barcelona, Sept. 6, 1993.

23. Size effect in tensile and compressive quasibrittle failures, JCI International Workshop on Size Effect in Concrete Structures, Plenary Lecture, Sendai, Japan, November 1, 1993.

24. Recent advances in fracture mechanics, size effect and rate dependence of concrete-implications for dams. Plenary Lecture, International Workshop on Dam Fracture and Damage, Chambéry, France, March 16, 1994.

25. Damage non-locality due to microcrack interactions: statistical determination of crack influence function (with M. Jirasek). Plenary Keynote Lecture at Europe-U.S. workshop on "Fracture and Damage in Quasibrittle Structures: Experiment, Modeling and Computer Analysis", held at Czech Technical University, Prague, September 21, 1994.

26. Scaling Theories for quasibrittle fracture: Recent advances and new directions, Plenary Lecture, Second International Conference on Fracture Mechanics of Concrete and Concrete Structures (FraMCoS-2), ETH (Swiss Federal Institute of Technology), Zürich, July 25, 1995.

27. Fracture characteristics and micromechanical theory of rock as a quasibrittle material: Apercu of recent advances, Plenary Keynote Lecture, 5th Int. Symp. on Rock Fragmentation by Blasting (FRAG-BLAST 5), Montreal, Aug. 26, 1996.

28. Mechanics of failure of materials and structures: An apercu of problems and progress. Opening Keynote Lecture, International Conference on Design and Assessment of Buildings Structures (commemorating 75th Anniversary of Klokner Institute), ČVUT, Prague, September 12, 1996.

29. Scaling of structural failure. Prager Medal Lecture. 33rd Annual Technical Meeting, Society of Engineering Science, Arizona State University, Tempe, October 21, 1996.

30. Recent advances in brittle-plastic compression failure: Damage localization, scaling and finite strain. Plenary Keynote Lecture, 5th Int. Conf. on Computational Plasticity (COMPLAS-5), Universitat Politècnica de Catalunya, Barcelona, March 17, 1997.

31. Modeling of concrete behavior: state-of-the-art. Plenary Lecture (one of four), 14th Int. Conf. on Structural Mechanics in Reactor Technology (SMiRT 14), Lyon, August 20, 1997.

32. Prediction of concrete creep and shrinkage: Past, present and future. Civaux Workshop on Containment Prestress, Poitiers, France, August 25, 1997.

33. Modeling of compressive strain softening, fracture and size effect in concrete. Opening Plenary Lecture, Conf. on Computational Modeling of Concrete Structures (EURO-C 1998), held in Badgastein, Austria, March 31, 1998.

34. Energetic theory of size effect and its application to fiber composites, 13th U.S. Nat. Congress of Applied Mechanics, University of Florida, Gainesville, FL, June 22, 1998.

35. Size effect in tensile and compression fracture of concrete structures: computational modeling and design. 3rd Inter. Conf. on Fracture Mechanics of Concrete Structures (FraMCoS-3), Plenary Lecture, Gifu, Japan

36. Size effect in concrete structures: Nuisance of necessity? *fib* Symposium, "Structural Concrete—the Bridge Between People," Prague, Oct. 14, 1999 (Fédération internationale de béton) (plenary keynote lecture).

37. Public financing of research and its importance (in Czech: Význam a financování statního výzkumu), 11th Intern. Scientific Conf. in Commemoration of 100th Anniversary of Czech Technical University in Brno (VUT), Brno, Oct. 18, 1999 (opening address).

38. Fracture scaling: new results and practical consequences, 33rd Solid Mechanics Conf. of Polish Academy of Sciences, Zakopane, Sept. 6, 2000.

39. Concrete durability scaling and hygro-thermal coupling. D.M. Roy Lecture. Endowed Principal lecture of Cements Division, Am. Ceramic Society Annual Meeting, Indianapolis, April 24, 2001.

40. Spatial and temporal scaling of concrete response to extreme environments (with G. Zi). Plenary Opening Lecture. 3rd Int. Conf. on Concrete under Severe Conditions, Vancouver, BC, June 18, 2001.

41. Probabilistic modeling of quasibrittle fracture and size effect. Plenary Keynote Lecture. 8th Int. Conf. on Structural Safety and Reliability (ICOSAR). Newport Beach (Marriott), California, June 20, 2001.

42. Asymptotic temporal and spatial scaling of coupled creep, aging, diffusion and fracture processes. Opening Plenary Keynote Lecture, 6th Intern. Conf. on Creep, Shrinkage and Durability Mechanics of Concrete and Other Quasi-Brittle Materials (CONCREEP-6), MIT, Cambridge, Aug. 20, 2001.

43. Stability and fracture scaling of composites: Recent advances. Plenary Keynote Lecture. 2nd Intern. Conf. on Structural Stability and Dynamics, Singapore (Orchard Hotel), Dec. 17, 2002.

44. Stochastic models for deformation and failure of quasibrittle structures: Recent advances and new directions. Plenary Keynote Lecture, co-author D. Novák). EURO-C Conf., Computational modelling of concrete structures. St. Johann im Pongau, Austria, March 17, 2003.

45. Scaling of failure of particulate and fiber composites: Overview of recent advances. Plenary Opening Keynote Lecture, 16th ASCE Engrg. Mechanics Division Conf., University of Washington, Seattle, July 17, 2003.
46. Scaling of failure of composites and sandwich structures. Plenary Keynote Lecture, 10th Int. Conf. Composites Engineering (ICCE-10), New Orleans (Wyndham Canal Place Hotel), July 21, 2003.
47. Scaling of failure of composites (opening plenary keynote lecture), International Symposium on Mechanics of Composites, Czech Techn. Univ. Prague, Oct. 14, 2002 (presented by M. Cerny).
48. Quasibrittle failure, uncertainty and design codes. Plenary Opening Lecture. RILEM Spring Meeting, “Advances in Concrete through Science and Engineering”, Northwestern University, Evanston, IL, March 22, 2004.
49. Durability modeling based on fracture, diffusion, chemomechanics and creep: Recent advances (plenary opening lecture). CONSEC’04 (4th Int. Conf. on Concrete under Severe Conditions: Environment and Loading), Seoul (Lotte Hotel - Jamsil), Korea, June 28, 2004.
50. Creep, diffusion and fracture in heated concrete structures: Recent progress, Opening Plenary Keynote Lecture, 6th International Congress on Thermal Stresses, Vienna University of Technology (T.U. Wien), May 27, 2005.
51. Concrete creep at high temperature and its interaction with fracture: Recent progress (co-author G. Cusatis). Plenary Lecture. 7th Int. Conf. on Creep, Shrinkage and Durability of Concrete and Concrete Structures (Concreep 7), Ecole Centrale de Nantes, France, Sept. 13, 2005.
52. Size effect, its role in structural catastrophes, and need for reform of reliability concepts in design codes (in Czech). Opening Plenary Lecture. Betonářské Dny 2005 (Annual Meeting of Czech Concrete Society), Universita Hradec Králové, Czech Republic, Nov. 30, 2005.
53. Effect of size on safety factors and strength of quasibrittle structures: beckoning reform of reliability concepts. Opening Plenary Lecture, The Structural Engineering Convention (SEC-2005), Indian Institute of Science, Bangalore, India, Dec. 14, 2005.
54. Computational structural reliability—a major challenge and opportunity for concrete and other quasibrittle materials (co-author S. Pang), Plenary Keynote Lecture, Conf. on Computational Modelling of Concrete Structures (EURO-C 2006), Mayrhofen, Austria, March 30, 2006.
55. Scaling of failure of quasibrittle composites and thin films: asymptotic matching. Mindlin Lecture, U.S. National Congress of Theor. & Appl. Mech., University of Colorado, Boulder, June 26, 2006.
56. Energetic-probabilistic size effect on structural strength, Plenary Lecture, 16th European Conf. on Fracture (ECF 16), Alexandroupolis, Greece, July 3, 2006.
57. Size and geometry effects on required safety factors for composites with softening damage. Plenary Opening Lecture, Int. Conf. on Damage in Composite Material: Nondestructive Testing and Simulation (B. Kröplin, chair), Stuttgart University, Germany, Sept. 18, 2006.
58. Statistical mechanics of failure risk—a challenge for computer simulation of quasibrittle structures at different scales (co-author: S.D. Pang). Plenary Opening Lecture, 16th International Workshop on Computational Mechanics of Materials (T. Sadowski, S. Schmauder, co-chairs), Lublin, Poland, Sept. 25, 2006.
59. Microplane and random lattice models for damage and fracture of heterogeneous quasi-brittle materials, Keynote (plenary opening) lecture, DoD-DoT Workshop on Modeling Concrete under High Impulsive Loadings (Kent Danielson, organizer), Institute for Advanced Technology, University of Texas, Austin, TX, March 20, 2007.
60. Nano-mechanics based size effect on safety factors and lifetime of quasibrittle structures. Plenary Opening Lecture of ECCOMAS Thematic Conference on “Modelling of Heterogeneous Materials” (MHM 2007, Z. Bittnar, H. Mang, co-chairs, M. Jirásek, organizer). Czech Technical University, Prague, June 25, 2007.
61. Probabilistic mechanics of scaling strength, lifetime and safety factors of quasibrittle structures: nano to macro. Plenary Opening Lecture, 8th HSTAM International Congress of Mechanics (D. Beskos, organizer), University of Patras, Greece, July 12, 2007.
62. Nano-mechanics based assessment of failure risk and lifetime of quasibrittle structures at different scales, Keynote Address (plenary opening lecture), 3rd Int. Conf. on Struct. Engrg., Mechanics and Computations (SEMC), University of Cape Town, Sept. 10, 2007.
63. Consequences of ignoring or misjudging the size effect in concrete design codes and practice. Plenary opening lecture. 1st Annual Convention of Taiwan Concrete Institute (TCI), Nov. 2, 2007, Taipei, Taiwan.
64. Consequences of ignoring or mis-judging the size effect in concrete design codes and practice. Plenary lecture. 3rd Structural Engineers World Congress, Nov. 5, 2007, Grand Ashok Hotel, Bangalore, India.
65. Size effect of probability of quasibrittle failure and lifetime: from atomistic to structural scale. Opening Principal Lecture, Int. Conf. on “Physical Aspects of Fracture Scaling and Size Effects”, org. by ETH Zürich, March 10, 2008, Monte Verità, Ascona, Switzerland.
66. Computing quasibrittle failure probabil-

ity: from nano to macro. Semi-Plenary Lecture, 8th World Congress on Computational Mechanics (WCCM8), July 2, 2008, Venice-Lido, Italy.

67. Size effect on strength and lifetime distributions of quasibrittle structures implied by interatomic bond break activation (with J.-L. Le and M.Z. Bazant), plenary lecture, 17th Eur. Conf. on Fracture, Brno, Czech Rep., Sept. 3, 2008.

68. Prediction of creep and shrinkage and their effects in concrete structures: critical appraisal (with G.-H. Li and Q. Yu). Opening Plenary Lecture. 8th Int. Conf. on Creep, Shrinkage and Durability of Concrete and Concrete Structures (CONCREEP-8), Ise-Shima, Japan, Sept. 30, 2008.

69. Quasibrittle fracture and its scaling: problems, progress, practice (Nadai Medal Lecture), ASME Intern. Mechanical Engrg. Congress, Boston, Nov. 4, 2008.

70. Scaling of strength of fiber composite structures (1 of 2 principal plenary lectures), 2nd ECCOMAS Thematic Conference on Mechanical Response of Composites, Imperial College, London, April 2, 2009.

71. Lessons from excessive long-time deflections and collapse of record-span segmental box girder bridge in Palau (plenary lecture), Korea Concrete Institute, Spring Convention, Busan, Korea, May 7, 2009.

72. Modeling of creep and hygrothermal deformations of concrete: Intriguing consequences of nanoporosity, Biot Lecture (plenary opening lecture), 4th Biot Conference on Poromechanics, Columbia University, New York, June 8, 2009.

73. Quasibrittle fracture and scale transitions: Problems, progress, practice (co-authors J.-L. Le, Q. Yu, C.G. Hoover, F.C. Caner). Plenary lecture, Intern. Congress of Croatian Society of Mechanics, Dubrovnik, Croatia, Sept. 30, 2009.

74. Modeling of concrete creep and hygrothermal deformations, and computation of their structural effects. Opening Plenary Lecture. EURO-C (Computational Modeling of Concrete Structures), Rohrmoos/Schladming, Austria, March 15, 2010.

75. Statistical aspects of quasibrittle size effect and lifetime, with consequences for safety and durability of large structures. Opening Plenary Lecture. 7-th Intern. Conf. on Fracture Mechanics of Concrete and Concrete Structures (FraMCoS-7), Jeju, Korea. May 24, 2010.

76. Nano-mechanics based theory of probability distribution and failure scaling of quasibrittle structure strength and lifetime. Plenary Lecture (50 min.), Intern. Conf. on Mechanical Properties of Materials (ICMPM 2010), Zhejiang University, Hangzhou, China, May 27, 2010.

77. Creep and hygrothermal effects in concrete structures highlighted by bridge in Palau and intriguing consequences of nano-porosity. Opening plenary lecture. 9th HSTAM Conference (Hellenic

Society for Theoretical and Applied Mechanics), Limassol, Cyprus, July 12, 2010.

78. Scaling of probabilistic quasibrittle structure strength and lifetime: unified nano-mechanical fracture theory. Opening Plenary Lecture, 3rd Mathematical Methods in Engineering International Symposium, Instituto Politécnico de Coimbra, Portugal, Oct. 21, 2010.

79. Black holes in probability tails: Challenge for safety analysis of quasibrittle structures (co-authors J.-L. Le and Jan Eliáš). Opening Plenary Lecture. 11th Int. Conf. on Computational Plasticity—Fundamentals and Applications (COMPLAS XI, an ECCOMAS Conf.), UPC, Barcelona, Sept. 7, 2011.

80. Computational challenges to cure a plague of multi-decade creep damage in concrete infrastructure (co-authors R. Wendner and M. Hübner), semi-plenary lecture, 10th World Congress of Computational Mechanics (WCCM), São Paulo, Brazil, July 11, 2012.

81. Compensating for errors of ABAQUS, LS-DYNA, ANSYS and NASTRAN in finite strain and bifurcation analysis of incrementally highly orthotropic or compressible solids. Semi-Plenary Lecture, ECCOMAS 2012 (6th Eur. Congress on Computational Methods in Appl. Sci. and Engrg.), Vienna (TU), 12 Sept. 2012.

82. Pervasive lifetime inadequacy of long-span box girder bridges and lessons for multi-decade creep prediction. IALCCE 2012 (Intern. Assoc. for Life-Cycle Civil Engineering), Vienna, Oct. 12, 2012.

83. Probabilistic nano-mechanical theory of quasibrittle structure strength, crack growth, lifetime and fatigue, GAMM—84th Annual Meeting of Intern. Assoc. of Applied Mathematics and Mechanics, Novi Sad, Serbia, March 20, 2013.

84. Fracture scaling and safety of quasibrittle structures: Atomistic basis, computational challenges and new advances. CFRAC 2013 (3rd Int. Conf. on Computational Modeling of Fracture and Failure of Materials and Structures), Czech Tech. Univ., Prague, June 7, 2013.

85. Progress in creep and shrinkage prediction engendered alarming bridge observations and expansion of laboratory database (Opening plenary lecture), 9th Int. Conference of Creep, Shrinkage and Durability Mechanics of Concrete and Concrete Structures (ConCreep-9), held at MIT, Cambridge, MA, Sept. 23, 2013.

86. Failure of large laminate-foam sandwich plates: Effects of size, cohesive fracture and objective stress rate. Plenary Opening Keynote Lecture, 4th Asia-Pacific Conf. on FRP in Structures, Swinburne University of Technology, Melbourne, Australia, Dec. 11, 2013.

87. Comminution of concrete due to kinetic energy of high shear strain rate. Plenary Lecture. EURO-C 2014 (Computational Modelling of Concrete and Concrete Structures), St. Anton am Arlberg, Aus-

tria, Mar. 24, 2014.

88. Why Fracking Works and How to Optimize It (Plenary Keynote), ASCE Eng. Mech. Inst. Meeting, Hong Kong Polytechnic University, Hong Kong, Jan. 7, 2015.

89. Analytical Nano-Macro Scale Bridging of Certain Concrete Properties, Plenary Lecture, 5th Int. Symp. on Nanotechnology in Construction, Chicago, IL, May 26, 2015.

90. Interaction of concrete creep, shrinkage and swelling with water, hydration and damage: nano-macro-chemo (plenary lecture), ConCreep-10, TU Wien, Vienna, Sept. 2, 2015.

91. Quasibrittle Fracture Mechanics: An Apercu of Recent Advances and Fecund Trends (Plenary Keynote), FraMCoS-9 (9th Int. Conf. on Fracture Mech. of Concrete and Concrete Str.), Berkeley, CA, June 1, 2016.

92. Myth and reality in predicting failure of fiber composites: quasibrittle fracture mechanics and non-statistical size effect, applied to car crashworthiness (plenary opening lecture), ICEM-17 (17th Int. Conf. on Experimental Mechanics), Rhodes Palace Hotel, Rhodes, Greece, July 4, 2016.

93. Probabilistic nano-mechanics-based finite weakest-link model for quasibrittle structure strength, size effect, lifetime and fatigue. Plenary Opening Lecture. SolMech-40 (40th Polish Mechanics Conference), Academy of Sciences, Warsaw, Poland, August 30, 2016.

94. Why Fracking Works and Why Not Better, ASME 2016 International Mechanical Engineering Congress & Exposition (AMD Plenary) Phoenix, AZ, November 16, 2016.

95. Probabilistic Mechanics of Quisibrittle Structures: Strength, Lifetime and Scaling, EMI 2017, San Diego, CA, June 5, 2017.

96. Three-phase cracked porous medium: Shale fracking and ASR damage, 6th Biot Conference on Poromechanics, ASCE/EMI, Paris, France, July 11, 2017.

97. Fishnet Statistics for Strength Probability Distribution and Size Effect of Nacre-Like Imbricated Lamellar Materials, 54th Annual Technical Meeting, SES 2017, Northeastern University, Boston, MA, July 26, 2017.

B. Distinguished, Named or Endowed Lectures Lectures at Universities and Research Institutions

1. Propagation of crack bands in heterogeneous materials, The 11th Arthur J. Boase Lecture, University of Colorado, Boulder, Feb. 11, 1982.

2. Propagation of crack bands in concrete structures and rock, The Special University Lecture of

University of London in Civil and Mechanical Engineering, Imperial College of Science and Technology, London, March 17, 1982.

3. Mathematical modeling of brittle failure of concrete and reinforced concrete, Kajima Fellow Lecture, Univ. of Tokyo, Japan, Jan. 27, 1987.

4. Failure, stability, and durability of structures: highlights of 21-year research at NU, Inaugural Lecture of Walter P. Murphy Professorship, Northwestern University, May 25, 1990.

5. Fracture and size effects in quasi-brittle structures, 2nd International Torroja Lecture (presented after being awarded the Gold Medal of the Building Research Institute of Spain), National Council for Scientific Research, Madrid, Spain, Jan. 21, 1991.

6. Scaling of structural failure: Concrete, rock, ice, composites, ceramics (presented in French). Public University Lecture, EPFL (Swiss Federal Institute of Technology Lausanne, March 11, 1997.

7. Failure of materials and structures: lessons from the past, highlights of success and view toward the future, Karlsruhe University, Karlsruhe, Germany, March 23, 1998 (honorary doctorate lecture).

8. Size and Ruin. Lecture delivered after the conferral of honorary doctorate, Politecnico di Milano, Oct. 18, 2001.

9. Asymptotic matching of size effects in structural failure: From nano to mega. William Gurley Lecture in Mechanical Engineering. Rensselaer Polytechnic Institute, Troy, NY, September 13, 2002.

10. Questions actuelles concernant l'introduction de progrès recent en mécanique de rupture dans la pratique, Docteur Honoris Causa Lecture INSA (Institut national des sciences appliquées), Lyon, France, Oct. 15, 2004.

11. Quasibrittle size effect, strength randomness and design codes. Warren Lecture (endowed) and Geomechanics Seminar, University of Minnesota, Dept. of Civil Engineering, Minneapolis, May 7, 2004.

12. Size effect and need for reform of reliability concepts for quasibrittle structures, Beyer Distinguished Lecture, Dept. of Civil and Envir. Engrg., University of Houston, April 8, 2005.

13. Size effect and need for reform of reliability concepts for quasibrittle structures, Richard J. Carroll Memorial Lecture, Dept. of Civil Engineering, Johns Hopkins University, at Engineering Society of Baltimore, April 13, 2005.

14. Extreme value statistics and size effect in fracture, Professor C.S. Krishnamoorthy Memorial Lecture, Indian Institute of Technology Madras, Chennai, India, Dec. 7, 2005.

15. Probabilistic mechanics of scaling of strength and lifetime of quasibrittle structures: nano to macro. IIS Mathematics Initiative Lecture, Nov. 7, 2008, Department of Mathematics, Indian Institute

of Science (IIS), Bangalore, India.

16. Size and risk: scaling of quasibrittle structure strength and lifetime based on atomistic fracture mechanics, Inaugural Lecture, Spanish Royal Academy of Engrg., Madrid, March 24, 2009.

17. Collapse of record-span segmental box girder bridge in Palau and lessons from excessive long-time deflections, 2009 Richardson Lecture, Dept. of Civil and Env. Engrg., University of Colorado, Boulder, April 15, 2009.

18. Size and risk: scaling of quasibrittle structure strength and lifetime based on atomistic fracture mechanics, 2009 Distinguished Lecture, Civil and Env. Engrg. Dept., Univ. of California Los Angeles (UCLA), May 19, 2009.

19. Mechanics of Progressive Collapse: What Did and Did Not Doom World Trade Center and What Can We Learn? Elisabeth Rockwell Lecture, Dept. of Mechanical Engrg., University of Houston, Oct. 13, 2009.

20. Scaling of probability distribution of quasibrittle structure strength and lifetime based on atomistic fracture mechanics. William Gurley Lecture, Dept. of Mechanical, Aerospace & Nuclear Engrg., Rensselaer Polytechnic Institute (RPI), Troy, NY, Dec. 2, 2009.

21. Scaling of probability distribution of quasibrittle strength & lifetime based on atomistic fracture mechanics. Frank L. Parker Lecture, Dept. of Civil & Env. Engrg., Vanderbilt University, Nashville, Kentucky, Feb. 1, 2010.

22. Progress engendered by collapses of record setting structures: Malpasset Dam, World Trade Center Towers and KB Bridge in Palau. Fazlur Rahman Khan Lecture, Rossin College of Engrg. & Appl. Sci., Lehigh University, Bethlehem, PA, Feb. 26, 2010.

23. Wake-up call from collapse of world-record bridge: Pervasiveness of excessive creep deflections, misleading concrete design codes and consequences of nano-porosity. Samuel J. Mathis Memorial Lecture, Dept. of Civil & Environmental Engineering, M.I.T., Cambridge, MA, Dec. 13, 2010.

24. Probabilistic nano-mechanical theory of quasibrittle structure strength, lifetime and fatigue. Timoshenko Lecture, Dept. of Mechanical Engrg., Stanford University, Palo Alto, CA, April 7, 2011.

25. Excessive creep deflections of prestressed segmental bridges: A wake-up call for design codes and consequences of nano-porosity, CEAS Distinguished Lectures, College of Engrg. and Appl. Sci., University of Wisconsin, Milwaukee, Oct. 28, 2011.

26. Pervasiveness of concrete creep problems in structures: wake-up call for design codes and consequences of nano-porosity. CoE Distinguished Lecture, College of Engrg., University of Miami, Corral Gables, FL, Nov. 7, 2011.

27. Pervasiveness of concrete creep problems in structures: Wake-up call for design codes and conse-

quences of nano-porosity. Honorary Professor Lecture, Southeast University, Nanjing, China, May 3, 2012.

28. Ditto. Honorary Professor Lecture, Xi'an Jiaotong University, Xi'an, China, May 7, 2012.

29. Energy-inconsistent objective stress rates in ABAQUS, ANSYS, LS-DYNA and other FE codes: magnitude of errors and how to correct them. Fowler Distinguished Lecture. Mech. Eng. Dept., Texas A&M University, Oct. 24, 2012.

30. Comminution of solids due to kinetic energy of high-rate shear, Distinguished Scholar Lecture in Mechanical and Aerospace Engineering, Arizona State University, Tempe, AZ, Oct. 18, 2013.

31. Why Fracking Works and How to Optimize It (Distinguished Lecture), Dept. of Mechanical & Industrial Engrg., Northeastern University, Nov. 14, 2014

32. Why Fracking Works and How to Optimize It, Warren Lecture, University of Minnesota, Minneapolis, Dec. 5, 2014.

33. Why Fracking Works and Why Not Well Enough, Distinguished Lecture of Faculty of Engineering, Chongqing University, Chongqing, China, January 12, 2015.

34. Why Fracking Works and Why Not Well Enough, Tsinghua Global Vision Lecture, Tsinghua University, Beijing, China, Jan. 13, 2015.

35. Why Fracking Works and Why Not Well Enough, Presidents' Distinguished Lecture Series in Engineering, Science and Medicine, Texas Tech University, Lubbock, TX, February 9, 2015.

36. Why Fracking Works and Why Not Well Enough, Edison Lecture, Aerospace and Mech. Engrg. Dept., University of Notre Dame, South Bend, IN, March 31, 2015.

37. Why Fracking Works and Why Not Well Enough, IMNI Distinguished Lecture, Institute for Molecular and Nanoscale Innovation, Brown University, Providence, RI, April 29, 2015.

38. To frac or not to frac? How quasibrittle fracture mechanics can sway the answer. Inaugural Lecture, Royal Society of London Meeting, July 10, 2015.

39. To Frac or Not to Frac? - How Mechanics of Quasibrittle Hydraulic Fracture Can Sway the Answer, Distinguished Lecture Series in Engineering, Florida Atlantic University, February 5, 2016

40. To Frac or Not to Frac? - How Mechanics of Quasibrittle Hydraulic Fracture Can Sway the Answer, Mechanical & Aerospace Engrg. 2016 Distinguished Lecture, George Washington University, Washington, D.C., May 4, 2016.

41. Size Effects in Concrete Structures: Failures, Safety and Design Codes, Hungarian Group of *fib*, Budapest, Hungary, April 21, 2016.

42. Probabilistic strength, size effect and lifetime of quasibrittle structures based on interatomic break frequency and finite weakest-link model, Boe-

ing Lecture, Dept. of Aerospace Engrg., University of Washington, Seattle, Nov. 7, 2016.

C. Seminars at Universities and Laboratories

1.-8. Eight seminars presented in Czech at Dopravoprojekt, SSŽ, SÚ-ČVUT and VUT Brno, Czechoslovakia, between 1960 and 1967.

9-10. Creep analysis of concrete structures (presented in German), Technische Universität Hannover, Dec. 19-20, 1966 (2 2-hour lectures).

11. Structure-soil interaction, Univ. of Toronto, Nov. 23, 1967.

12. Creep of concrete and structure-soil interaction, Univ. of Waterloo, Jan. 29, 1968.

13. Stress-strain law and thermodynamics of concrete creep, Univ. of Kentucky, Lexington, Nov. 18, 1968.

14. Stress-strain law and thermodynamics of concrete creep, University of Missouri, Columbia, Nov. 19, 1968.

15. Constitutive equation for creep and shrinkage of concrete, Univ. of Toronto, Nov. 14, 1968.

15a. 14. Stress-strain law and thermodynamics of concrete creep, Northwestern University (interview lecture), Evanston, Dec. 1968.

16. Constitutive equation for creep and shrinkage of concrete, Univ. of Pennsylvania, Philadelphia, Jan. 1969.

17. Constitutive relations for concrete, Univ. of Texas, Austin, Jan. 1969.

18. Constitutive relations for concrete, Univ. of California, Davis, Feb. 1969.

19. Mechanical and thermodynamic behavior of concrete as a multiphase material, California Institute of Technology, Pasadena, Feb. 11, 1969.

20. On general incremental three-dimensional theories of elastic instability, University of California, Berkeley, May 19, 1969.

21. Deformations of concrete due to mass transport, University of California, Berkeley, Aug. 19, 1969.

22. Constitutive relations for concrete, Columbia University, N.Y., Nov. 20, 1969.

22a. A comparison of formulations of incremental deformations and elastic stability, Mechanics Colloquium, Northwestern University, 1970.

23. A comparison of formulations of incremental deformations and elastic stability, NASA Langley Research Center, Summer Fac. Res. Program, Norfolk, VA, June 25, 1970.

24. Problems in creep analysis of concrete structures, Politecnico di Torino (Ints. de Scienza d. Costruzioni), Italy, Sept. 13, 1971.

25. Mass transport processes as a source of time-dependent deformations of concrete, Concrete Re-

search Laboratory, Karlstrup, Denmark, Sept. 15, 1971.

26. Constitutive equations for concrete creep and shrinkage based on thermodynamics of multiphase systems, Technical University of Denmark, Sept. 15, 1971.

27. Mathematical modeling for inelasticity of concrete, Stanford University, Dept. of Civil Engineering, April 11, 1973.

28. A new approach to inelasticity and failure of concrete and sand: endochronic theory, Dept. of Civil Engineering, University of Minnesota, Minneapolis, Nov. 1, 1974.

29. Towards general constitutive laws for concrete and sand, Mechanics Seminar, Univ. of Utah, Salt Lake City, Div. of Mechanics, Feb. 14, 1975.

30. Inelasticity and failure of concrete, Taylor & Woodrow Co., Ltd., London, Sept. 3, 1975.

31. A new mathematical model for inelastic, multiaxial behavior and failure of concrete: endochronic theory, Techn. Univ. of Norway, Trondheim, Sept. 16, 1975.

32. Constitutive equations for creep, shrinkage and moisture effects in concrete, Techn. Univ. of Norway, Trondheim, Sept. 17, 1975.

33. Constitutive relations for creep, shrinkage, moisture effects in concrete, Swedish Cem. & Conr. Inst. of Techn., Stockholm, Sept. 22, 1975.

34. A new mathematical model for multiaxial nonlinear behavior and failure of concrete, Swedish Cem. & Conr. Inst. Royal Inst. of Techn., Stockholm, Sept. 23, 1975.

35. Material problems in the design of concrete structures for nuclear reactors (presented in French), Ecole Polytechnique Fédérale, Institut de Production d'Énergie, Lausanne, Switzerland, Sept. 16, 1975.

36. A new model for the thermomechanical behavior of concrete, Colloquia on Modern Topics in Mechanics, Northwestern University, IL, Oct. 17, 1975.

37. Endochronic failure theories, Franklin Res. Institute, Philadelphia, Apr. 1, 1976.

38. Inelastic behavior of concrete, Georgia Inst. of Technology, Atlanta, April 6, 1976.

39. Mathematical models for inelastic behavior of concrete and geological materials, Natl. University of Mexico, Mexico City, Sept. 22, 1976.

40. Inelastic behavior, failure and unstable strain localization in geological materials, Brown University, Providence, RI, Solid Mechanics Seminar, Dec. 6, 1976.

41. Mathematical models for inelastic behavior of concrete and soils, Seminar, Illinois Institute of Technology, Apr. 22, 1977.

42. Micromechanics of hardened portland cement paste and concrete, Northwestern University, Colloquia on Progress in Materials Science, May 10, 1977.

43. Mechanism of Creep in Concrete, National Research Council, Div. of Building Research, Ottawa, Canada, June 25, 1977.
44. On crack stability and related subjects, Royal Inst. of Technology (KTH), Faculty of Aerospace Engineering, (Dept. of Solid Mechanics), Stockholm, Sept. 13, 1977.
45. Moisture transfer in heated concrete, Chalmers University, Goteborg, Sweden, Sept. 16, 1977.
46. Lecture series on inelastic behavior of concrete, National University of Mexico, Nov. 8-10, 1977.
- 46a. Models for concrete inelasticity, Seminar, Dept. of Civil Engrg., Georgia Institute of Technology, Atlanta, 1978.
47. Endochronic theory for concrete, Federal Univ. of Rio de Janeiro, Brazil, Apr. 7, 1978.
48. Time-dependent behavior of concrete, Federal University of Rio Grande do Sul, Porto Alegre, Brazil, Apr. 11, 1978.
49. Inelastic time-independent behavior of concrete, Federal University of Rio Grande do Sul, Porto Alegre, Brazil, Apr. 12, 1978.
50. Plasticity and endochronic theory, Federal Univ. of Rio Grande do Sul, Porto Alegre, Brazil, Apr. 13, 1978.
51. Methods used in the U.S. in analysis of nuclear reactor structures, Federal University of Rio Grande do Sul, Porto Alegre, Brazil, Apr. 14, 1978.
52. Thermal effects in concrete, Univ. of Technology, Delft, Apr. 24, 1978.
53. Endochronic inelasticity and incremental plasticity, Istituto di Ingegneria Civile, Università degli studi, Florence, Italy, June 12, 1978.
54. Aging and nonlinearity in creep of concrete, Laboratorio di Analisi Numerica, University of Pavia, Italy, June 19, 1978.
55. Nonlinear and time-dependent deformations of concrete, series of seven lectures at Politecnico di Milano, Italy, June 20-21, 1978.
56. Practical prediction of time-dependent deformations of concrete, Politecnico di Torino, Italy, June 23, 1978.
57. Endochronic and plastic theories for cyclic response of soils, University of Illinois, Urbana, Sept. 18, 1978.
58. Models for concrete inelasticity, University of California, Berkeley (SESM Colloquia), Oct. 9, 1978.
59. Propagation and crack stability in rock and concrete, University of California, Berkeley (SESM Colloquia), Jan. 15, 1979.
60. Models for large cyclic strain of soils, University of California, Berkeley (Geotech. Society), Jan. 17, 1979.
61. Endochronic and plastic-fracturing constitutive relation for concrete and soils, Stanford University, Solid Mech. Seminar, Jan. 18, 1979.
62. Stability and spacing of cooling cracks in rock, Stanford University, Geothermal Program Seminar, Jan. 18, 1979.
63. Models for Concrete Inelasticity, Caltech, Pasadena, Jan. 23, 1979.
64. Endochronic and plastic-fracturing theories for constitutive laws of concrete and soils, Virginia Institute of Technology, Blacksburg, Feb. 12, 1979.
65. Nouvelles analyses des mécanismes de fissuration et de ruptures des bétons et des roches (presented in French), I.T.B.T.P. (with French Assoc. for Research in Materials and Structures), Paris, Feb. 15, 1979.
66. Experimental constitutive equations of concrete in dynamics, Euratom, Ispra, Italy, Feb. 23, 1979.
67. Mechanics of fractures in massive concrete structures, ISMES (Istituto Sperimentale Modelli e Strutture), Bergamo, Italy, March 5, 1979.
68. Plastic-fracturing theory for concrete, Institut für Baustoffkunde, Tech. Univ., Munich, March 8, 1979.
69. Models for concrete inelasticity, Swiss Federal Institute of Technology (ETH) Zürich, March 13, 1979.
70. Models for concrete inelasticity, MIT, Cambridge, Mass., April 10, 1979.
71. Thermal cracking and hot dry rock geothermal energy (Report on contract research), Los Alamos Scientific Lab., N.M., July 6, 1979.
72. Heat and mass transfer in concrete at high temperature, series of 6 lectures at Sandia Laboratories, Kirtland Air Force Base, Albuquerque, N.M., July 9-11, 1979.
73. Creep of concrete and its stochastic properties, national Bureau of Standards, Aug. 13, 1979.
74. Practical models for concrete creep, State Research Center, Concrete Lab., Espoo, Finland, Aug. 27, 1979.
75. Models for cracking in concrete, State Research Center, Concrete Lab., Espoo, Finland, Aug. 28, 1979.
76. Endochronic and plastic theories for concrete, Tech. University of Finland, Otaniemi, Espoo, Aug. 30, 1979.
77. Analysis of Cracking in Concrete by Finite Elements, Tech. Univ. of Vienna, Sept. 12, 1979.
78. Triaxial constitutive laws for concrete, Techn. Univ. of Vienna, Sept. 13, 1979.
79. Propagation and stability of crack bands in heterogeneous materials, Washington Univ., Clayton, St. Louis, Jan. 24, 1980.
80. Propagation and stability of cracks in concrete and rocks, Univ. of Utah, Salt Lake City, Feb. 2, 1980.
81. Endochronic theories for geomaterials, Terra-Tek Corp., Salt Lake City, Feb. 1, 1980.
82. Plastic-fracturing materials, RPI, Troy, N.Y., Feb. 21, 1980.

83. Propagation of crack bands in concrete, Univ. of Waterloo, Ontario, May 26, 1980.
84. Propagation of crack bands in concrete, Univ. of Toronto, May 27, 1980.
85. Practical creep analysis and design, Ontario Hydro, Aug. 20, 1980.
86. Behavior of concrete under rapid loading, ISMES (Istituto Sperimentale Strutture e Modelli) Bergamo, Italy, Sept. 11, 1980.
87. Endochronic models for geomaterials and concretes (presented in French), I.M.G., Université de Grenoble, France, Sept. 19, 1980.
88. Fracture of concrete (in French), Ecole Nationale des Ponts et Chaussées, Paris, Sept. 22, 1980.
89. Triaxial behavior of concrete (in French), Ecole Nationale des Ponts et Chaussées, Paris, Sept. 23, 1980.
90. Creep of concrete (in French), Ecole Nationale des Ponts, et Chaussées, Paris, Sept. 24, 1980.
91. Humidity and temperature effects (in French), Ecole Nationale des Ponts et Chaussées, Paris, Sept. 25, 1980.
92. Creep and relaxation in concrete and structures, Institut für Massivbau, Technische Hochschule, Aachen, West Germany, Sept. 30, 1980.
93. Propagation of crack bands in concrete, Univ. of Alberta, Edmonton, March 20, 1981.
94. Endochronic theory for soils, School of Civil Engng. University of Madrid, June 5, 1981.
95. Inelastic behavior of geomaterials, University of Madrid, June 8, 1981.
96. Fracture of reinforced concrete (in German), Technical University, Vienna, June 11, 1981.
97. Propagation and response of crack bands in concrete and rock, Appl. Mech. Seminar, Univ. of Michigan, Ann Arbor, Sept. 14, 1981.
98. Mathematical modelling of fracture propagation in concrete and rock, Ill. Inst. of Tech., Chicago, Nov. 24, 1981.
99. Propagation of crack bands in concrete structures and rock, Colloquia on Modern Topics in Mechanics, Northwestern University, Evanston, IL, Jan. 15, 1982.
100. La rupture et la propagation des zones de fissuration dans le béton et les roches (presented in French), Ecole Polytechnique de Montreal, March 4, 1982.
101. Fracture and propagation of cracking zones in concrete and rock, Seminars in Mechanics, McGill University, Montreal, March 5, 1982.
102. Fracture of concrete and rock via stress-strain relations, Applied Mechanics Colloquia, University College of Swansea, U.K., March 19, 1982.
103. Concrete fracture, Seminar at Università degli Studi di Bologna, Italy, March 29, 1982.
104. Viscoelastic behavior of concrete, Lecture at Politecnico di Milano, Italy, March 22, 1982.
105. Propagation of crack bands in concrete structures and rock, Columbia University, New York, Apr. 1, 1982.
106. Moisture movement in concrete, Seminar at W. R. Grace & Co., Research Division, Columbia, Maryland, Apr. 6, 1982.
107. Propagation of crack bands in heterogeneous materials, Fatigue Thrust Group Seminar at Mat. Sci. Dept., Northwestern University, Apr. 14, 1982.
108. Analysis of concrete structures for creep, Seminar at Skidmore, Owings & Merrill, Chicago, IL, Apr. 21, 1982.
109. Multiaxial short-time deformations of concrete, Lecture at Politecnico di Milano, Italy, June 8, 1982.
110. Fracture of concrete, Lecture at Politecnico di Milano, Italy, Sept. 8, 1982.
111. Constitutive equation of wood at variable humidity and temperature, Forest Products Laboratory of U.S. Dept. of Agriculture, Madison, Wisc., Oct. 18, 1982.
112. Creep in concrete containment shells, Informal Seminar, Ontario Hydro, Toronto, Oct. 27, 1982.
113. Fracture and progressive microcracking in concrete and rocks, Center for Materials Science, Los Alamos National Laboratory, March 24, 1983.
114. Size effect in reinforced concrete failure, with application to shear of beams (presented in French), Swiss Federal Inst. of Technology, Lausanne, June 8, 1983.
115. Crack band model for fracture analysis of concrete and geomaterials (presented in French), Swiss Federal Inst. of Technology, Lausanne, June 9, 1983.
116. Probabilistic aspects of creep and shrinkage in concrete structures (presented in French), Swiss Federal Inst. of Technology, Lausanne, June 16, 1983.
117. Cumulative fracture and strain-softening in concrete and geologic materials, Stanford Research Institute, Palo Alto, Jan. 13, 1984.
118. Progressive fracture of heterogeneous materials and imbricate continuum, The Johns Hopkins University, Baltimore, Feb. 6, 1984.
119. Concrete structures for nuclear reactors: new developments, problems and trends, ASCE Illinois Section Structural Division Dinner Meeting, Chicago, Apr. 18, 1984.
120. Probabilistic analysis of creep and shrinkage effects in concrete structures, Tech. Univ. of Belgrade, Sept. 14, 1984.
121. Mathematical models for progressive fracture of concrete and reinforced concrete, Università di Palermo, Sicily, Sept. 14, 1984.
122. Size effect in failure of concrete structures, Università di Palermo, Sicily, Sept. 25, 1984.
123. Creep and shrinkage of concrete at variable humidity: constitutive law and mechanism, Swiss Federal Inst. of Technology, Lausanne, Oct. 4, 1984.

124. Mechanics of fracture and progressive cracking in concrete structures, Inst. für Massivbau, Techn. Univ. Karlsruhe, Oct. 5, 1984.
125. Nonlocal continuum model for strain-softening due to distributed cracking, Dept. of Civil Engng., MIT, Oct. 31, 1984.
126. Propagation of crack bands in concrete and rock, University of Cape Town, Nov. 18, 1984.
127. Size effect caused by fracturing in concrete structures, Univ. of Cape Town, Dec. 6, 1984.
128. Probabilistic prediction of creep and shrinkage effects in concrete structures, Univ. of Cape Town, Dec. 11, 1984.
129. Nonlocal approach to strain-softening, Joint Seminar of Depts. of Civil Engng. & Mech. Engng., Univ. of Colorado, Boulder, Feb. 11, 1985.
130. Nonlocal continuum model for strain-softening and failure due to distributed damage, Lawrence Livermore Laboratory, Livermore, CA, March 25, 1985.
131. Concrete creep at variable humidity and temperature, Kajima Institute of Construction Technology, Tokyo, May 25, 1985.
132. Three Seminars on fracture and inelastic behavior of concrete, Nanjing Institute of Technology, Nanjing, China, May 30 - June 1, 1985.
133. Probabilistic prediction of the effects of concrete creep and shrinkage, KAIST (Korea Adv. Inst. of Science and Technology), Seoul, June 3, 1985.
134. Concrete structures for nuclear reactors, Seoul National University, Korea, June 4, 1985.
135. Fracture mechanics of concrete structures and size effect, Univ. of Canterbury, Christchurch, New Zealand, Nov. 8, 1985.
136. Size effect and crack band model, Univ. of Adelaide, Australia, Nov. 18, 1985.
137. Distributed cracking in concrete and geomaterials, Monash University, Clayton, Victoria, Australia, Nov. 19, 1985.
138. Creep of wood at variable humidity, CSIRO (Commonwealth Sci. and Ind. Res. Org.), Highett, Victoria, Australia, Nov. 20, 1985.
139. Nonlocal continuum approach to distributed cracking, Univ. of Adelaide, Australia, Nov. 25, 1985.
140. Uncertainty modeling and Bayesian probabilistic prediction of creep in structures, Univ. of Adelaide, Australia, Dec. 2, 1985.
141. Fracture mechanics of concrete structures and size effect, Univ. of Sydney, Australia, Dec. 6, 1985.
142. Probabilistic approach to the prediction of creep and shrinkage of concrete, Univ. of New South Wales, Kensington, N.S.W., Australia, Dec. 9, 1985.
143. Creep in concrete: An update of past and current research at Northwestern University, Univ. of Hawaii, Honolulu, Dec. 11, 1985.
144. Technology update lecture on Fracture mechanics and size-effects in concrete structures, U.S. Bureau of Reclamation, Denver, Jan. 7, 1986.
145. Size effect in failure due to distributed cracking, RPI (Rensselaer Polytechnic Institute), Troy, N.Y., Jan. 24, 1986.
146. Size effect in brittle failure of concrete structures, Colloquium on Modern Topics in Mechanics, Northwestern University, Jan. 31, 1986.
147. Size effect in failure due to distributed cracking, Faculty Seminar Series, Univ. of Minnesota, Apr. 25, 1986.
148. Size effect in structural failure due to blunt fracture, joint Seminar of Dept. of Civil Engng. and Dept. of Theor. and Appl. Mech., Cornell University, Ithaca, N.Y. May 6, 1986.
149. Improved serviceability design of prestressed concrete box girder bridges against long-time deflections and cracking, ASCE Illinois Section Dinner Meeting, Chicago, May 28, 1986.
150. Current problems of fracture mechanics, Techn. Univ. of Madrid, Spain, June 10, 1986.
151. Mécanique de fissuration distribuée et effet d'échelle (in French), Laboratoire de Mécanique et d'Acoustique C.N.R.S., Marseille, July 2, 1986.
152. Size-effects and fracture mechanics of concrete structures, Dipartimento di ingegneria strutturale e Geotecnica, Università degli Studi di Roma, Italy, Sept. 29, 1986.
153. Crack band model, *ibid.*, Sept. 29, 1986.
154. Nonlocal continuum approach to distributed cracking, *ibid.*, Sept. 30, 1986.
155. Creep of concrete at variable temperature and humidity, *ibid.*, Sept. 30, 1986.
156. Uncertainty modeling of creep, *ibid.*, Sept. 30, 1986.
157. Bayesian probabilistic prediction of long-time deformations, *ibid.*, Sept. 31, 1986.
158. Fracture of geomaterials, Dipartimento di Mineraria e Metallurgica, Università degli Studi di Cagliari, Italy, Oct. 2, 1986.
159. Size effects and distributed cracking, *ibid.*, Oct. 2, 1986.
160. Time dependent behavior of concrete and its uncertainty, *ibid.*, Oct. 3, 1986.
161. Effect d'échelle et localisation dans les matériaux avec radoucissement (delivered in French), Laboratoire de Mécanique et Technologie, E.N.S. de Cachan, Université Paris 6, Oct. 9, 1986.
162. Mécanismes de fissuration repartie et effets d'échelle dans le béton et les géomatériaux (delivered in French), I.T.B.T.P., St.-Rémy -lès-Chevreaux (Paris), Oct. 10, 1986.
163. Fracture and size effect, Shimizu Institute of Technology, Tokyo, Japan, Jan. 29, 1987.
164. Failure mechanisms and fracture mechanics of concrete and geomaterials: experiment and theory, University of Yokohama, Japan, Feb. 4, 1987.
165. Fracture of concrete, Kajima Institute of Construction Technology, Tokyo, Feb. 5, 1987.

166. Size effects in concrete structures, University of Kyoto, Japan, Feb. 6, 1987.
167. Nonlinear fracture mechanics of concrete: recent developments, Dept. of Civil Eng. & Inst. of Appl. Mech., National Taiwan University, Taipei, R.O.C., Feb. 9, 1987.
168. Size effect and fracture mechanics of concrete, Dipartimento di Ingegneria Strutturale, Politecnico di Milano, Italy, Apr. 9, 1987.
169. Mathematical and physical aspects of strain-softening and localization limiters, *ibid.*, Apr. 9, 1987.
170. Nonlocal Continuum, *ibid.* Apr. 10, 1987.
171. Stress-strain relations for progressive distributed cracking, *ibid.*, Apr. 10, 1987.
172. Localization of distributed damage and nonlocal fracture analysis, Mechanics Colloquium, Brown University, Providence, R.I., May 19, 1987.
173. Justification of nonlocal continuum concept by quasiperiodic microcrack array, Informal Seminar at Laboratory of Mechanics and Technology, ENS, Paris-Cachan, Sept. 5, 1987.
174. Why continuum damage is nonlocal: justification by a quasiperiodic crack array, Mechanics Club Seminar, Northwestern University, Nov. 5, 1987.
175. Stable states and stable path of structures with plasticity and damage, Mechanics Seminar, California Institute of Technology, Pasadena, Nov. 16, 1987.
176. Thermodynamic stability analysis of structures with plasticity or damage, Structural Engineering Seminar, University of Illinois, Urbana, Dec. 7, 1987.
177. Stable states and stable path of structures with damage, plasticity or fracture, Joint Engineering Mechanics and Civil Engineering Seminar, University of Wisconsin, Madison, Jan. 21, 1988.
178. Stability and bifurcation in structures exhibiting damage, fracture or plasticity, Civil Engineering Guest Lecture, University of Alberta, Edmonton, Canada, Feb. 11, 1988.
179. Bifurcations and distinction between stable states and stable paths of plastic and fracturing structures, Seminar, Department of Civil Engineering, Washington University, Saint Louis-Clayton, March 7, 1988.
180. Thermodynamic analysis of stable states and stable paths of irreversible structural systems, Structural Engineering Seminar Series, Northwestern University, May 20, 1988.
181. Stable response paths of structures with damage, cracking or plasticity, Civil Engineering Seminar, Ohio State University, Columbus, May 27, 1988.
182. Stability of state and path of structures exhibiting damage, interacting cracks or plasticity, Guest Seminar, Laboratory of Mechanics and Technology, Ecole Normale Supérieure, Université Paris 6, Cachan, July 1, 1988 (presented in French).
183. Localization of strain-softening damage and stable paths, Seminar, Department of Structural Engineering, Politecnico di Milano, Italy, July 7, 1988.
184. Generalized microplane model for tensile cracking and nonlinear compression and shear response of concrete, *ibid.*, July 7, 1988.
185. Constitutive modeling of concrete: micromechanics and fracture aspects, Center for Structural Mechanics, Technical University of Lisbon (CMEST), Portugal, July 14, 1988.
186. Stable path of propagation of interacting fractures or damage zones, Structural Engineering Seminar at Cornell University, September 15, 1988.
187. Thermodynamic analysis of stable crack propagation and damage in inelastic structures, Joint Seminar in Solid Mechanics and Civil Engineering, The University of Michigan, Ann Arbor, October 4, 1988.
188. Stability of state and path of structures exhibiting damage, interacting cracks or plasticity, Seminar in Solid Mechanics, Department of Mechanical Engineering, Aeronautics and Astronautics and Civil Eng., Stanford University, October 20, 1988.
189. Brittleness and size effect in structural failures of concrete and rock, Distinguished Civil Engineering Lecture Series (jointly with Mechanics and Materials Seminars), Texas A&M University, College Station, November 1, 1988.
190. Stable states and stable paths of structures with plasticity, damage or fracture propagation, seminar at Universidad de Buenos Aires, Argentina, January 9, 1989.
191. Size effect and nonlocal analysis of brittle failure of heterogenous materials: Concrete, rock, soils, ceramics, *ibid.*, January 9, 1989.
192. Applications of fracture mechanics to the design of concrete structures and size effect, seminar at Faculty of Physical Sciences and Mathematics, Universidad de Chile, Santiago, January 16, 1989.
193. Stable path of response of structures with plasticity, damage and interactive fracture, *ibid.*, January 16, 1989.
194. Application of fracture mechanics to the design of concrete structures, seminar at Department of Engineering, Pontificia Universidad Católica del Peru, Lima, Peru, January 20, 1989.
195. Fracture mechanics and its consequences for the design of concrete structures, seminar at Skidmore, Owings and Merrill, Chicago, January 25, 1989.
196. Size effect and nonlocal aspects of fracture in concrete, rock and ceramics, seminar at Department of Civil Engineering, University of Arizona, Tucson, February 27, 1989.
197. Localization of damage in solids, seminar in Department of Civil Engineering, Mechanics, and Metallurgy, The University of Illinois at Chicago, March 8, 1989.

198. Localization of damage, bifurcation and non-local stress-strain relations, seminar in Department of Civil Engineering, University of California, Davis, May 1, 1989.
199. Localization and nonlocal approach to damage in brittle heterogeneous materials, seminar at US Army Materials Technology Laboratory, Watertown, Massachusetts, May 11, 1989.
200. R-Curve behavior and size effect in fracture of softening materials (concrete, rock, ceramics), Mechanics Club Seminar, Department of Civil Engineering, Northwestern University, Evanston, May 25, 1989.
201. Fracture mechanics, size effect and its implication for the design of concrete structures, lecture at Portland Cement Association at ACI Committee 318 Meeting, Skokie, Illinois, August 28, 1989.
202. Fracture mechanics size effects in concrete structures, Structural Engineering and Mechanics Seminar, University of Colorado, Boulder, August 31, 1989.
203. Should concrete design codes consider fracture mechanics size effect?, Technical University of Munich, Germany, February 5, 1990.
204. Fracture mechanics of concrete structures and size effects, University of Karlsruhe, Institute of Mechanics and Institute of Materials Technology, February 6, 1990.
205. Size effect in fracture mechanics and its application to concrete structures (presented in French), org. by AFREM (held in hotel SUFFRENTOUR), Paris, February 9, 1990.
206. Deterministic and statistical size effects in brittle failure of concrete structures and nonlocal models, Swiss Federal Institute of Technology (ETH), April 2, 1990.
207. Strain softening and micromechanics of quasi-brittle materials, Stuttgart University, Germany, Sept. 3, 1990.
208. Computational mechanics of fracture and damage in quasi-brittle structures, Stuttgart University, Germany, Sept. 4, 1990.
209. Statistical theory of size effect in quasi-brittle structures, Dept. of Civil Engineering, Università degli Studi di Genova, Italy, Oct. 1, 1990.
210. Nonlocal generalizations of Weibull statistical theory for size effect in quasi-brittle structures, Dept. of Structural Engineering, Politecnico de Milano, Italy, Oct. 4, 1990.
211. Statistical and deterministic size effects in fracture of quasi-brittle materials, Dept. of Mining Engineering, University of California, Berkeley, Nov. 6, 1990.
212. Size effect in quasi-brittle structures and nonlocal models, Structures and Mechanics Seminar Series, Dept. of Civil Engineering and Operations Research, Princeton University, Nov. 15, 1990.
213. Nonlocal models for damage and size effect, Kirtland Air Force Base, Shock Physics Division, Albuquerque, NM, Jan. 11, 1991.
214. Size effect in failure of quasi-brittle structures, Polytecnic University of Catalonia, International Center of Numerical Methods in Engineering, Barcelona, Jan. 17, 1991.
215. Nonlocal generalization of Weibull statistical theory of size effect in quasi-brittle structures, Dept. of Mechanics, Faculty of Mechanical Engineering, Technical University, Munich, Jan. 29, 1991.
216. Micromechanics arguments for nonlocality of continuum damage, Institut für Werkstoffe im Bauwesen, Stuttgart University, Feb. 1, 1991.
217. Recent advances in deterministic and statistical theories of size effect in structures with damage and localization (presented in French), Laboratory of Mechanics, E.N.S., Paris, Cachan, Feb. 7, 1991.
218. Size effect in failure of quasi-brittle structures, Institute of Mechanics, Faculty of Civil Engineering, Technical University, Vienna, Austria, Feb. 13, 1991.
219. Size effect in failure of quasi-brittle materials, Faculty of Civil Engineering, Technical University Brno, Czechoslovakia (presented in Czech), Feb. 15, 1991.
220. Size effect in failure of quasi-brittle structures (presented in Czech), Czech Technical University at Prague, Faculty of Civil Engineering, Czechoslovakia, Feb. 19, 1991.
221. Size effects and brittle fracture of concrete and concrete structures, Special lecture at Institution of Structural Engineers, London, U.K., Feb. 21, 1991.
222. Should fracture mechanics size effects be introduced into concrete design codes? Dept. of Civil and Mineral Engineering, University of Minnesota, Minneapolis, MN, March 1, 1991.
223. Fracture of semi-brittle materials and scale effects, Applied Physics Laboratory, University of Washington, Seattle, WA, March 18, 1991.
224. Nonlocal statistical size effect in structures with large stable crack growth, Constructed Facilities Division Seminar, Dept. of Civil Engineering, MIT, Boston, March 21, 1991.
225. Size effect in failure of structures exhibiting stable fracture growth, Materials and Structures Seminar, Dept. of Civil and Environmental Engineering, University of Western Michigan, Ann Arbor, MI, May 16, 1991.
226. Size effect in failure of quasi-brittle structures, Faculty of Engineering Science Seminar Series, the University of Western Ontario, London, Ontario, Canada, May 17, 1991.
227. Fracture mechanics of concrete structures and size effect, Dept. of Civil and Environmental Engineering, Politecnico University, New York, June 6, 1991.
228. Fracture of brittle materials, guest lecture of Graduiertenkolleges, Institute for Structural Design

and Construction, Stuttgart University, Germany, June 25, 1991.

229. Instabilities and bifurcations in structures with strain-softening damage (presented in Czech), Klokner Institute, Czech Technical University, Prague, Czechoslovakia, July 3, 1991.

230. Instabilities and bifurcations caused by localization of damage or fracture, Institute of Mechanics, Dept. of Mechanical Engineering, T.H. Darmstadt, July 8, 1991.

231. Size effect in brittle failure of concrete structures, Shimizu Institute of Technology, Shimizu Corp., Tokyo, Aug. 21, 1991.

232. Size effect in failure of quasi-brittle structures – energy release and nonlocal theory, National Chung-Hsing University, Tai-Chung, Taiwan, Aug. 23, 1991.

233. Consequences of fracture mechanics for future design practice and codes for reinforced concrete structures, a lecture for practicing engineers sponsored by the Chinese Institute of Civil and Hydraulic Engineering and the Chinese Society of Structural Engineering, Dept. of Civil Engineering, National Taiwan University, Taipei, Aug. 26, 1991.

234. Nonlocal generalization of Weibull statistical strength theory, Center for Earthquake Engineering Research, National Taiwan University, Taipei, Aug. 27, 1991.

235. Should design codes consider fracture mechanics size effect? Korea Institute of Construction Technology (co-sponsored by Korean Concrete Institute, KCI), Seoul, Korea, Aug. 29, 1991.

236. Nonlocal generalization of Weibull statistical theory and nonlocal finite element codes, Structural Engineering Dept., Korea Atomic Energy Research Institute, Taejeon, Korea, Aug. 30, 1991.

237. Critique and nonlocal generalization of Weibull-type random strength theories for quasi-brittle structures, Colloquia on Modern Topics in Mechanics, Northwestern University, October 18, 1991.

238. Deterministic and statistical size effects and critique of Weibull-type theories of random strength, Solid Mechanics Seminar, Arizona State University, Tempe, November 1, 1991.

239. Thermodynamic aspects of structural stability, E.N.S. de Cachan, France, February 12, 1992.

240. Stability problems of damage and fracture, *ibid.*, February 18, 1992.

241. Problems of large scale fracture of sea ice, (presented in French) Solid Mechanics Colloquium, Ecole Polytechnique, Palaiseau, France, February 20, 1992.

242. Size effect in large-scale bending fracture of floating sea ice plates, Civil Engineering Seminar, University of Arizona, Tucson, May 15, 1992.

243. Scaling laws and nonlocal concepts in mechanics of fracture and damage, Dept. of Mechan-

ics, Technical University, Budapest, Hungary, August 31, 1992.

244. Recent results on scaling laws for fracture and damage and nonlocal continuum models (presented in Czech), Institute of Theoretical and Applied Mechanics (UTAM), Prague, Czech Republic, September 3, 1992.

245. New nonlocal damage concept for concrete based on micromechanics of crack interactions, IWB, Stuttgart University, Germany, September 11, 1992.

246. Size effects in brittle failure of concrete and reinforced concrete structures, SEA/OI (Structural Engineers Association of Illinois) Dinner Meeting, Chicago, November 3, 1992.

247. New nonlocal damage concept based on micromechanics of crack interactions, University of Southern California, Los Angeles, November 10, 1992.

248. Nonlocal microplane model for damage and failure analysis of concrete structures, Waterways Experiment Station (WES), U.S. Army Corps of Engineers, Vicksburg, MS, December 16, 1992.

249. Scaling laws and nonlocal concepts for mechanics of damage, Rensselaer Polytechnic Institute, Troy, NY, January 14, 1993.

250. Scaling laws and nonlocal concepts for mechanics of damage, Clarkson University, Potsdam, NY, January 15, 1993.

251–55. Stability, localization and scaling problems in the theory of damage and fracture, Series of five seminars, Politecnico di Milano, Italy, February 2, 4, 9, and 12, 1993.

256. Scaling laws, nonlocal concepts and micromechanics of quasibrittle materials, Università degli Studi di Brescia, Italy, February 10, 1993.

257. Scaling laws, nonlocal concepts and micromechanics of quasibrittle materials, Università di Pavia, Italy, February 11, 1993.

258. Stability, localization and scaling problems in the theory of damage and fracture (presented in French), Dept. of Civil Engineering, INSA, Lyon, France, February 17, 1993.

259. Time-dependence of fracture and fatigue of concrete and rocks (presented in French), Dept. of Civil Engineering, INSA, Lyon, France, February 18, 1993.

260. Scaling laws and nonlocal concepts for mechanics of damage, MIT, Cambridge, MA, March 17, 1993.

261. Scaling laws and nonlocal concepts for mechanics of damage, Thayer School of Engineering, Dartmouth College, Hanover, NH, March 19, 1993.

262. Theory of concrete creep, U.S. Bureau of Reclamation, Denver, April 14, 1993.

263. Scaling laws and nonlocal concepts in mechanics of damage and fracture (presented in French), Ecole Polytechnique, Montreal, Quebec, Canada, April 29, 1993.

264. Scaling laws and nonlocal concepts in mechanics of quasibrittle materials (presented in French), University of Sherbrooke, Quebec, Canada, May 5, 1993.
265. Scaling laws and nonlocal concepts for mechanics of damage, Nagoya University and Japan Society of Civil Engineers, Nagoya, Japan, November 4, 1993.
266. New results and modern trends in creep and cracking analysis of concrete structures, Obayashi Technical Research Institute, Toyko, Japan, November 5, 1993.
267. Continuum approximation for localization in solids with interacting microcracks, Joint Structural Engineering & Structural Mechanics Seminar, University of Colorado, Boulder, Co., December 9, 1994.
268. Nonlocal continuum damage theory based on micromechanics of crack interaction, Shell Development Company, Houston, TX, February 15, 1994 (Lecturer on (Southwest Mechanics Lecture Series)).
269. Nonlocal continuum damage theory based on micromechanics of crack interaction, Rice University, Houston, TX, February 16, 1994 (Southwest Mechanics Lecture Series).
270. Nonlocal continuum damage theory based on micromechanics of crack interaction, Texas A&M University, College Station, Houston, TX, February 17, 1994 (Southwest Mechanics Lecture Series).
271. Nonlocal continuum damage theory based on micromechanics of crack interactions, Dept. of Mechanical Engineering, Tulane University, New Orleans, La., February 18, 1994.
272. Continuum model for damage localization in solids with interacting microcracks, Div. of Applied Science, Harvard University, Cambridge, MA., February 23, 1994.
273. Ibid. Colloquia on Modern topics in mechanics, Northwestern University, February 25, 1994.
274. Damage localization, quasibrittle fracture and size effect, Swiss Federal Institute of Technology (EPFL), Lausanne, March 8, 1994.
275. Penetration fracture of sea ice plate (Informal Seminar), Dept. of Civil Engineering, University of Alaska, Anchorage, Alaska, May 9, 1994.
276. Quasibrittle compression fracture: stability aspect and size effect, Advanced Composites Development Dept., Boeing Commercial Airplane Group, Seattle-Renton, Wa., July 1, 1994.
277. Nonlocal continuum model for damage based on micro mechanics of crack interaction, Depts. of Mechanical Engineering & Applied Mathematics, University of Manitoba, Winnipeg, Canada, August 12, 1994.
278. Damage localization in quasibrittle materials, Technical University Lulea, Sweden, September 26, 1994.
279. Thermodynamic and stability aspects of localization, Technical University Lulea, Sweden, September 27, 1994.
280. Nonlinear fracture mechanics and cracking models, Technical University Lulea, Sweden, September 28, 1994.
281. Size effect in quasibrittle fracture, Technical University Lulea, Sweden, September 29, 1994.
282. Continuum model for localization of cracking damage and size effect, The University of Akron, Department of Civil Engineering, November 28, 1994.
283. Is fractal nature of crack surfaces the cause of size effect?, Joint Seminar of Structural Engineering and Structural Mechanics Group, Geotechnical Group, and Center of Acoustics, Mechanics and Materials (Civil and Mechanical Engineering Departments), University of Colorado, Boulder, December 9, 1994.
284. Is fractal nature of crack surfaces the cause of size effect?, Building Materials Division, NIST (National Institute of Standards and Technology) Gaithersburg, Maryland, January 11, 1994.
285. Fracture propagation and scaling: fact or fad?, Seminar in Mechanics Club, Northwestern University, January 19, 1995. (Joint seminar with Structural Engineering Seminar Series).
286. Fracture propagation and scaling: fact or fad? Civil Engineering Faculty, Czech Technical University in Prague (CVUT), February 6, 1995.
287. Causes of size effects in quasibrittle fracture: stored energy, fractality and random strengths, ETH (Swiss Federal Institute of Technology), Zürich, February 23, 1995.
288. Microprestress solidification theory for concrete creep and humidity effects, Tohoku University, Sendai (hosts: Mihashi, Abe), Feb. 8, 1996
289. Recent research on fracture and size effect in quasibrittle materials, Hokkaido University, Sapporo (hosts: Kakuta, Joh, Goto), Feb. 10, 1996.
290. Recent results on size effect in concrete structures, Kajima Institute of Technology (hosts: Nojiri, Nobuta), Tokyo, Feb. 21, 1996.
291. Size effect in quasibrittle failure, Dept. of Civil Eng., University of Tokyo (hosts: Okamura, Maekawa), Feb. 23, 1996.
292. Size effect in failure of concrete structures, Taisei Co., Tokyo (host: Tanaka), Feb. 29, 1996.
293. Recent researches in size effects in failure of concrete structures, Obayashi Research Institute, Tokyo, March 1, 1996.
294. Localization of damage. Politecnico di Milano, September 17, 1996.
295. Fracture mechanics of concrete. Politecnico di Milano, September 18, 1996.
296. Size effect in concrete structures. Politecnico di Milano, September 22, 1996.
297. Scaling of structural failure: Concrete, rock, composites. Università di Trento. Trento, Italy, September 19, 1996.
298. Scaling of structural failure: Concrete, rock, composites, ice. Sandia National Laboratories, Engineering Sciences Special Seminar, October 18, 1996.

309. Scaling laws and size effects in nonlinear fracture mechanics. Seminar, Department of Civil Engineering, Washington University, St. Louis-Clayton, February 3, 1997.
310. Rupture en compression (presented in French). Seminar, EPFL (Swiss Federal Institute of Technology) Lausanne, February 27, 1997.
311. Effet d' échelle en rupture quasifragile (presented in French). Seminar, EPFL (Swiss Federal Institute of Technology) Lausanne, March 6, 1997.
312. Théorie de solidification pour le fluage du béton (presented in French). Seminar, EPFL (Swiss Federal Institute of Technology) Lausanne, March 7, 1997.
313. Scaling of structural failure: Concrete, rock, ice, composites, ceramics. Seminar, Series in Applied Mechanics, CIMA, Universitat Politecnica de Catalunya, Barcelona, March 21, 1997.
314. Scaling of structural failure, Mechanical/Aeronautical Engrg. Seminar, Georgia Institute of Technology, Atlanta, 1997.
315. Scaling of quasibrittle compression fracture. Seminar, Dept. of Civil Engrg. and Engrg. Mech., Columbia University, May 16, 1997.
316. Scaling of structural failure. Seminar, Dept. of Civil Engrg., University of Wales, Swansea, U.K., June 13, 1997.
317. Scaling of structural failure, Technical University Istanbul, Turkey, Sept. 8, 1997.
318. Quasibrittle compression fracture and size effect, Gazi University, Ankara, Turkey, Sept. 10, 1997.
319. New results in concrete creep and shrinkage and its interaction with fracture, Gazi University, Ankara, Turkey, Sept. 10, 1997.
320. Asymptotic scaling analysis of compression fracture, Rensselaer Polytechnic Institute, Troy, New York, Nov. 7, 1997.
321. Creep and shrinkage model B3 for analysis and design of concrete structures, Korea Electric Power Research Institute (KEPRI), Taejun, Korea, Nov. 28, 1997.
322. Compression fracture of concrete, *ibid.*, Nov. 29, 1997.
323. Compression fracture of concrete: recent advances and future challenges, Tsinghua University (Civil Engrg. Dept.), Beijing, China, Dec. 3, 1997.
324. Quasibrittle compression fracture and its scaling. Ecole Polytechnique, Palaiseau, Paris, France, March 19, 1998 (as part of Seminaire de Mécanique Ile-de-France Sud).
325. Scaling of quasibrittle compression fractures, Stuttgart University (Institut für Werkstoffe im Bauwesen), March 24, 1998.
326. Nonlinear fracture mechanics, University of Palermo, Sept. 14, 1998.
327. Fracture scaling, *ibid.*, Sept. 15, 1998.
328. Nonlocal approach to strain-softening damage, *ibid.*, Sept. 15, 1998.
329. Structural Catastrophes: What have we learned? Structural Engrg. Seminar Series, Northwestern University, Jan. 15, 1999.
330. Size effect theory and applications to fiber reinforced composites, Joint Structural Engineering and Structural Mechanics Seminar, University of Colorado at Boulder, Jan. 29, 1999.
331. Major structural failures: Their causes and how to avoid them, ASCE Student Chapter, Northwestern University, March 2, 1999.
332. Localization instabilities, ETSECCPB, Universitat Politecnica de Catalunya (UPC). March 17, 1999.
334. Fracture and size effect in quasibrittle materials, ETSECCPB, Universitat Politecnica de Catalunya (UPC), Barcelona, March 18, 1999.
335. Structural Catastrophes: What have we learned? ETSECCPB, Universitat Politecnica de Catalunya (UPC), Barcelona, March 23, 1999.
336. Size effect on compression strength of fiber composites failing by kink band propagation. Politecnico di Milano, March 30, 1999.
337. Katastrofy konstrukcí: Co jsme se naučili? (in Czech, Structural catastrophes: What have we learned?), Civil Engrg. Faculty, Czech Technical University, Prague, April 8, 1998.
338. Scaling of compression fracture of fiber composites and other quasibrittle materials, Dept. of Mechanical Engrg., Arizona State University, Tempe, April 16, 1999.
339. Scaling of compression fracture of fiber composites and other quasibrittle materials. Dept. of Civil Engrg., MIT, May 21, 1999.
340. *ibid.*, Dept. of Theor. & Appl. Mech., University of Illinois at Urbana-Champaign, Sept. 30, 1999.
341. *ibid.*, Institute of Construction and Architecture (ÚSTARCH), Slovak Academy of Sciences, Bratislava, Oct. 20, 1999.
342. Catastrophes of structures: Lessons Learnt (in Czech). Faculty of Civil Engineering, Slovak Technical University, Bratislava, Oct. 21, 1999.
343. Scaling of compression fracture of fiber composites and other quasibrittle materials. Institut für Mechanik, Technische Universität Wien, Vienna, Oct. 22, 1999.
344. New results on asymptotic scaling of quasibrittle fracture and their practical implications, Civil Engrg. Dept., University of British Columbia, Vancouver, March 21, 2000.
345. Fracture and damage localization, Politecnico di Milano, Italy, April 3, 2000.
346. New results on asymptotic scaling of quasibrittle fracture and their practical implications. Politecnico di Milano, Italy, April 4, 2000.
347. Fracture analysis of compression kink band failures in fiber composites. Politecnico di Milano, Italy, April 5, 2000.

348. New results on asymptotic scaling of quasibrittle fracture and their practical implications. Università degli studi di Parma, Italy, April 6, 2000.
349. Thermodynamic analysis of stability of inelastic structures. Politecnico di Milano, Italy, April 7, 2000.
350. New results on asymptotic scaling of quasibrittle fracture and their practical implications. Faculty of Civil Engrg., Czech Technical University in Prague (ČVUT), April 13, 2000.
351. New results on asymptotic scaling of quasibrittle fracture and their practical implications. Petroleum Engrg. Seminar, Cambridge University, Cambridge, U.K., April 18, 2000.
352. Structural catastrophes: What have we learned? Seminar, Dept. of Civil Engrg., National University of Singapore, Jan. 12, 2001.
353. Fracture scaling: problems, progress, practice. Seminar, Dept. of Civil Engrg. National University of Singapore, Jan. 17, 2001. 354. Fracture scaling: problems, progress, practice. Seminar, Dept. of Civil Engrg. The Hong Kong University of Science and Technology, Jan. 19, 2001.
355. Scaling in solid mechanics: from nano to mega, Seminar, as part of Colloquia on Modern Topics in Mechanics, Northwestern University, Feb. 2, 2001.
356. Scaling in solid mechanics: from nano to mega, Seminar, Swiss Federal Institute of Technology (EPFL), Lausanne, March 9, 2001.
357. Structural catastrophes: What have we learned? Seminar, Swiss Federal Institute of Technology (EPFL), Lausanne, March 13, 2001.
358. Creep, shrinkage and durability of concrete. Seminar, Swiss Federal Institute of Technology (EPFL), Lausanne, March 19, 2001. Prague (ČVUT). Sept. 6, 2001.
359. Probabilistic modeling of quasibrittle failure and limitations of existing stochastic finite element models (in Czech). Institute of Structural Mechanics, Faculty of Civil Engineering, Czech Technical University in Prague (ČVUT) (dedicated to memory of Zdeněk J. Bažant). Sept. 6, 2001.
360. Collapse of the World Trade Center Towers: Theory, Experiment and Reality. A panel discussion, with C.H. Dowding, R.J. Krizek and D. Schulz, panel members, Northeastern University, Oct. 10, 2001.
361. Why did the World Trade Center collapse? Structural Engineering and Seminar, Northwestern University, Oct. 10, 2001.
362. Scaling in solid mechanics: From nano to mega. Departments of Civil and Mechanical Engineering, University of Colorado, Boulder, Jan. 23, 2001.
363. Scaling in solid mechanics: From nano to mega. Mechanics Seminar Series, MIT, Cambridge, MA, Feb. 19, 2002.
364. Scaling in solid mechanics: From nano to mega. California Institute of Technology, Pasadena. March 5, 2002.
365. Asymptotic scaling of metal plasticity on approach to nanoscale. Institute of Thermomechanics of Czech Academy of Sciences (AVČR) (dedicated to memory of Zdeněk J. Bažant), Prague, March 19, 2002.
366. Size and ruin: From Sleipner platform to World Trade Center. Seminar. Istituto Universitario de Architettura, Venice, March 22, 2002.
367. Asymptotic scaling of metal plasticity on approach to nanoscale. Seminar, Dipt. di Costruzioni e Trasporti, Università degli Studi di Padova, Padua, Italy, March 29, 2002.
368. Scaling in solid mechanics: From nano to mega. Structures Seminar. University of California, Irvine, May 24, 2002.
369. Size and ruin. Structural/Materials Engineering Seminar, Purdue University, West Lafayette, Indiana, October 22, 2002.
370. Size and ruin. School of Civil & Envir. Engrg., Nanyang Technological University, Singapore, December 19, 2002.
371. Size and ruin. Civil & Envir. Engrg. Dept., Univ. of California Los Angeles (UCLA), Westwood, CA, January 16, 2003.
372. Size and ruin. Joint Seminar of Dept. of Mechanical & Industrial Engrg. and of Dept. of Civil & Envir. Engrg. (Struct. Engrg. Seminar Series), University of Illinois at Urbana-Champaign, March 3, 2003.
373. Stochastic models for deformation and failure of quasibrittle structures: Recent advances and new directions (in Czech). Civil Engrg. Faculty, Czech Techn. University in Prague (ČVUT). March 10, 2003.
374. Size and Ruin. School of Civil & Envir. Engrg., Cornell University, Ithaca, NY, March 7, 2003.
375. Energetic-probabilistic scaling of fracture of particulate and fiber composites: Recent Advances. Seminar, Politecnico di Milano, Dipartimento di Ingegneria Strutturale, Milan, Sept. 15, 2003.
376. Stability and fracture of large superlight-core sandwich structures. Università di Firenze, Seminar, Facoltà di Ingegneria, Florence, Sept. 16, 2003.
377. Stability and fracture of large superlight-core sandwich structures. Seminar, Politecnico di Milano, Dipartimento di Ingegneria Strutturale, Milan, Sept. 22, 2003.
378. Energetic-probabilistic size effect on structural strength, Seminar, Dept. of Mechanical Engrg., Florida Atlantic University, Boca Raton, Florida, Dec. 9, 2003.
379. Probability distribution of energetic-statistical size effect in quasibrittle fracture, University of Colorado, Dept. of Civil and Envir. Engrg., Boulder, Colorado, Jan. 23, 2004.
380. Size effect in quasibrittle structures, strength randomness and design codes. Seminar, China University of Mining and Technology, Dept. of Civil

Engrg., Beijing, June 24, 2004.

381. Stability and fracture of structures soft in shear: Fiber composites and sandwich structures. Seminar, China University of Mining and Technology, Dept. of Civil Engrg., Beijing, June 24, 2004.

382. Size effect in quasibrittle structures, strength randomness and design codes. Tsinghua University, Department of Engineering Mechanics, Beijing, June 25, 2004.

383. Stability and fracture of structures soft in shear: Fiber composites and sandwich structures. Seminar, Sichuan University, Dept. of Civil Engrg., Chengdu, China, June 26, 2004.

384. Finite strain effect and stability of soft-in-shear structures: Why existing updated Lagrangian algorithm is unusable? Seminar, Faculty of Civil Engineering, Czech Technical University, Prague, August 23, 2004.

385. Fracture scaling of quasibrittle composites and thin films: New asymptotic matching approach, University of Cambridge, Cambridge, U.K., Oct. 22, 2004.

386. Current issues in introducing recent advances in fracture and size effect in practice and design codes, ASCE Illinois Section, Structural Group Seminar, Greek Island Restaurant, Chicago, Nov. 10, 2004.

387. Quasibrittle size effect and its role in structural reliability concepts for design codes, Structural Engineering Seminar Series, University of Illinois, Urbana, Nov. 29, 2004.

388. Size effect in quasibrittle composites and thin films: Asymptotic matching, Princeton Institute for the Science and Technology of Materials (PRISM), Princeton University, Dec. 8, 2004.

389. Scaling of failure of quasibrittle composites and thin films: Asymptotic matching, Solids, Structures and Materials Seminar, Dept. of Aerospace Engrg. and Engrg. Mechanics, University of Texas, Austin, Feb. 1, 2005.

390. Scaling of failure of quasibrittle composites and thin films: Asymptotic matching, Joint Structures and Materials Seminar, University of British Columbia, Vancouver, March 4, 2005.

391. Size and Ruin, Meeting of Polish-American Engineers Association, Holiday Inn O'Hare, April 15, 2005.

392. Scaling of failure of quasibrittle composites and thin films: Asymptotic matching, Joint Aero/ME/CEE/Naval Architecture Seminar, Dept. of Aeronautical Engineering, University of Michigan, Ann Arbor, April 26, 2005.

393. Fracture of heated concrete structures and microwave decontamination, Dipartimento di Ingegneria Strutturale, Politecnico di Milano, Italy, June 27, 2005.

394. Size dependence of quasibrittle structures and consequences for reliability, Dipartimento di Ingegneria Strutturale, Politecnico di Milano, Italy,

June 28, 2005.

395. New ideas on tail probability distribution of strength and size dependence of resistance part of safety factors, Informal Seminar, Materials Research Group (Prof. Elices and Planas), Universidad Politecnica de Madrid, Sept. 9, 2005.

396. Extreme value statistics of quasibrittle fracture and its scaling, Laboratoire de Mécanique et Technologie, E.N.S. de Cachan, France, Sept. 14, 2005.

397. Statistical mechanics of safety factors, Seminar, Dept. of Civil & Env. Engrg., MIT, Cambridge, MA, Nov. 1, 2005.

398. Ditto, Seminar, Dept. of Civil Engrg., City College of New York (CCNY), City University of New York (CUNY), Nov. 4, 2005.

399. Statistical mechanics of failure risk: from atomic to structural scale, Joint Seminar of Mechanics Colloquium, Lectures in Applied Mathematics and Materials Science Colloquium, Northwestern University, Jan. 27, 2006.

400. Statistical thermo-mechanics of reliability of brittle and quasibrittle structures: from nano to macro, Structural Engineering, Mechanics and Materials Seminar, University of California, Berkeley, Jan. 30, 2006.

401. Ditto, Structural Engineering and Structural Mechanics Seminar, University of Colorado, Boulder, Jan. 31, 2006.

402. Statistical mechanics of safety factors: from nano to macro, Mechanics Seminar, Czech Technical University in Prague (ČVUT), March 21, 2006.

403. Statistical thermo-mechanics of reliability of brittle and quasibrittle structures: from nano to macro, Mechanical Engineering Graduate Seminar, University of Iowa, Iowa City, April 13, 2006.

404. Statistical mechanics of safety factors: from atomistic to structural scale. School of Civil Engineering, Georgia Institute of Technology, Atlanta, April 26, 2006.

405. Mechanics basis of size effects on safety factors for quasibrittle structures. Kolloquium für Mechanik (P. Steinmann, organizer), Technische Universität Kaiserslautern, Germany, Sept. 19, 2006.

406. Mechanics of WTC towers collapse: What can we learn? Kolloquium für Mechanik, ditto, Sept. 19, 2006.

407. What can we learn from the collapse of World Trade Center? (Co se můžeme naučit z kolapsu světového obchodního střediska?, presented in Czech), Katedra mechaniky, Czech Technical University in Prague (ČVUT), Sept. 22, 2006.

408. Statistical mechanics of safety factors: from atomistic to structural scale. Seminar, Institute of Fundamental Technological Research (Instytut Podstawowych Problemow Techniki, IPT), Mechanics of Materials Dept. (Z. Mróz, organizer), Warsaw, Poland, Sept. 27, 2006.

409. Size effect on safety factors and lifetime of quasibrittle structures, Dept. of Civil Engrg. (A. Haldar, organizer), University of Arizona, Tucson, Feb. 16, 2007.
410. Mechanics of progressive collapse: What doomed World Trade Center and what can we learn? Structural Mechanics Seminar Series (G. Kardomateas, organizer), College of Engrg., Georgia Institute of Technology, Atlanta, April 3, 2007.
411. Mechanics of progressive collapse: What did and did not doom World Trade Center and what can we learn? Structural Engineering Seminar, Northwestern University, Evanston, IL, May 24, 2007.
412. Nano-Mechanics Based Size Effect on Safety Factors and Lifetime of Quasibrittle Structures. Dept. of Mechanics (D. Sotiropoulos, organizer), Technical University of Crete, Chania, Greece, July 9, 2007.
413. Collapse of World Trade Center Towers: What did and did not cause it? National Chen-Kung University (NCKU), Oct. 30, 2007, Tainan, Taiwan.
414. Mechanics of progressive collapse: What did and did not doom World Trade Center, and what we can learn. Dipartimento di Ingegneria Strutturale, Politecnico di Milano, Nov. 12, 2007, Milan, Italy.
415. Microplane modeling of damage or fracture, and multiscale concepts. Dipartimento di Ingegneria Strutturale, Politecnico di Milano, Nov. 13, 2007, Milan, Italy.
416. Nano-mechanics based assessment of failure risk and lifetime of quasibrittle structures at different scales. Dipartimento di Ingegneria Strutturale, Politecnico di Milano, Nov. 13, 2007, Milan, Italy.
417. Multiscale, microplane and lattice models: advantages, limitations and localization problems. Struct. Eng. and Struct. Mech. Seminar, University of Colorado, Jan. 15, 2008, Boulder, Colorado.
418. Failure risk and lifetime of quasibrittle structures: from atomistic to structural scale. Struct. Engrg. Seminar Series, University of Illinois Urbana-Champaign (UIUC), Jan. 28, 2008, Urbana, Illinois.
419. Failure risk and lifetime of quasibrittle structures: from atomistic to structural scale. MMMC (Mech., Modeling, Experimentation, Computation) Seminar Series, Dept. of Mechanical Engrg., M.I.T., Feb. 19, 2008, Boston, MA.
420. Failure risk and lifetime of quasibrittle structures: from atomistic to structural scale. ETH, March 7, 2008, Zürich-Hönggerberg, Switzerland.
421. Failure risk and lifetime of quasibrittle structures: from atomistic to structural scale. ESPCI (Ecole supérieure de physique and de chimie industrielle), LPCT (Laboratoire de physique et chimie théorique), March 21, 2008, Paris 5.
422. Computing quasibrittle failure probability: from nano to macro. Croatian Assoc. for Mech., University of Rijeka, June 27, 2008, Rijeka, Croatia.
423. Multiscale, microplane and lattice models: advantages, limitations and localization problems, Tongji University (Civil Engrg. Dept.), Shanghai, Sept. 24, 2008.
424. Consequences of ignoring the size effect in concrete practice and design codes in shear, Shanghai Jiao Tong University, Sept. 26, 2008.
425. Prediction of concrete creep, shrinkage and their effects in structures: Critical appraisal, Techn. Univ. Vienna (Institute for Materials and Structures), Nov. 24, 2008.
426. Size and risk: scaling of fracture of composites, AF Wright Patterson Base, Dayton, Ohio, Dec. 12, 2008.
427. Size and risk: Scaling of quasibrittle structure strength and lifetime based on atomistic fracture mechanics, Univ. of Pennsylvania, Dept. of Mechanical Engrg. and Appl. Mech., Philadelphia, Feb. 19, 2009.
428. Failure risk and lifetime of quasibrittle composites: nano to macro, Northwestern University, Theor. and Appl. Mech. Seminar, Feb. 27, 2008.
429. Size and risk: Scaling of quasibrittle structure strength and lifetime based on atomistic fracture mechanics, University of Utah, Dept. of Materials Science and Engrg., Salt Lake City, March 4, 2009.
430. Lessons from excessive long-time deflection and collapse of record-span segmental box girder bridge in Palau, Instituto de Ciencias de la Construcción Eduardo Torroja, Madrid, March 26, 2009.
431. Lessons from excessive long-time deflections and collapse of record-span segmental box girder bridge in Palau, Czech Technical University (CTU), Joint Lecture of CTU Institute of Mechanics and of Czech Society of Mechanics, Prague, March 30, 2009.
432. Scaling of quasibrittle structure strength and lifetime based on atomistic fracture mechanics, and analogy with high-k dielectrics, Seminar of Dept. of Materials and Engrg., Northwestern University, Evanston, IL, June 2, 2009.
433. Scaling of quasibrittle structure strength and lifetime based on atomistic fracture mechanics, and analogy with high-k dielectrics, GALCIT Colloquium, Graduate Aerospace Laboratories, California Institute of Technology, Pasadena, CA, June 5, 2009.
434. Scaling of quasibrittle strength and lifetime probability based on atomistic fracture mechanics, and analogy with high-k dielectrics, Dept. of Mechanical Engrg. & Mat. Sci., Rice University, Houston, Oct. 14, 2009.
435. Scaling of probability distribution of quasibrittle structure strength and lifetime based on atomistic fracture mechanics. Dept. of Mechanical Engrg., University of Connecticut, Storrs, CT, Dec. 4, 2009.
436. Scaling of quasibrittle strength and lifetime probability based on atomistic fracture mechanics, and analogy with high-k dielectrics, Dept. Civil Engineering, University of Minnesota, Minneapolis, MN, Oct. 16, 2009.

437. Scaling of probability distribution of quasibrittle structure strength and lifetime: Multiscale nano-fracture basis. Dept. of Civil & Env. Engrg., University of California, Irvine, Feb. 5, 2010.
438. Scaling of probability distribution of quasibrittle structure strength and lifetime based on atomistic fracture mechanics. Faculty of Civil Engineering, Czech Technical University, Prague, March 11, 2010.
439. Probabilistic nano-mechanics based theory of quasibrittle structure strength, lifetime and fatigue. Institut für Baustoffe, Fakultät Bauingenieurwesen, Technische Universität Dresden, Dresden, July 21, 2010.
440. Probabilistic nano-mechanics based theory of quasibrittle structure strength, lifetime and fatigue, Solid Mechanics Seminar, Royal Institute of Technology (KTH), Stockholm, Oct. 19, 2010.
441. Progress engendered by collapses of record setting structures: Malpasset Dam, World Trade Center tower and KB Bridge in Palau. Dept. of Civil Engineering, University of British Columbia, Vancouver, BC, Canada, Nov. 15, 2010.
442. Wake-up call from collapse of world-record bridge: Pervasiveness of excessive creep deflections, misleading concrete design codes and consequences of nano-porosity. Seminar in Structural Engineering, Mechanics and Materials, Dept. of Civil and Env. Engrg., University of California, Berkeley, CA, Jan. 24, 2011.
443. Probabilistic nano-mechanical theory of quasibrittle structure strength, crack growth, lifetime and fatigue. Department of Civil Engineering, Delft University of Technology, The Netherlands, June 14, 2011.
444. Excessive creep deflections of prestressed segmental bridges: A wake-up call for design codes and consequences for nano-porosity. Dept. of Civil Engineering, Technion, Haifa, Israel, Sept. 11, 2011.
445. Progress engendered by collapses of record setting structures: World Trade Center Towers, Malpasset Dam and KB Bridge in Palau, Dept. of Mechanical Engrg., Tel Aviv University, Tel Aviv, Israel, Sept. 14, 2011.
446. Theory of sorption hysteresis in nanoporous solids—snap-through instabilities. Special Seminar, Dept. of Civil Engrg., M.I.T., Cambridge, MA, Dec. 5, 2011.
447. Disjoining pressure and sorption hysteresis of adsorbate in nanoporous materials, Faculty-Faculty Seminar, Northwestern University, Jan. 3, 2012.
448. Pervasiveness of concrete creep problems in structures: Wake-up call for design codes and consequences of nano-porosity. College of Engineering Seminar, University of Akron, Akron, OH, March 21, 2012.
449. Excessive bridge deflections: Wake-up call for design codes. Infrastructure Technology Institute (ITI), Research Associates Meeting, Evanston, April 9, 2012.
450. Energy-inconsistent objective stress rates in ABAQUS, ANSYS, LS-DYNA and other FE Codes: Magnitude of errors and how to correct them. School of Engineering, Peking University, Beijing, May 10, 2012.
451. Probabilistic nano-mechanical theory of quasibrittle structure strength, lifetime and fatigue. Dept. of Engineering Mechanics, Tsinghua University, Beijing, May 11, 2012.
452. Wake-up call from collapse of world-record bridge: Pervasiveness of excessive creep deflections and misleading design codes. Dept. of Engineering Mechanics, Tsinghua University, Beijing, May 11, 2012.
453. Errors of ABAQUS, LS-DYNA, ANSYS and other commercial codes caused by using energy-inconsistent objective stress rates (co-authors J. Vorel and M. Gattu), NU 2012 Summer Workshop on Computational Science and Engineering (in honor of Wing-Kam Liu's 60th birthday), Hilton Garden Inn, Evanston, IL, July 23, 2012.
454. Unified nano-mechanics based probabilistic theory of quasibrittle and brittle structures. Croatian Academy of Sciences and Arts. Zagreb, Sept. 14, 2012.
455. Pervasiveness of concrete creep problems in structures: Wake-up call for design codes and consequences for nano-porosity. Gradevinski fakultet, University of Rijeka. Sept. 19, 2012.
456. Probabilistic nano-mechanical theory of quasibrittle structure strength, crack growth, lifetime and fatigue. TU Denmark, Lyngby, Oct. 1, 2012.
457. Sorption hysteresis and disjoining pressures in nanoporous solids, with implications for multi-decade creep deflections of concrete bridges. Joint CEE and ME Lecture, University of Pittsburgh, Nov. 15, 2012.
458. Probabilistic nano-mechanical theory of quasibrittle structure strength, crack growth, lifetime and fatigue. Mech. Eng. Det., Carnegie-Melon University, Nov. 16, 2012
459. Perspectives from an Applied Mechanician. Theor. and Appl. Mech. Club, Northwestern University, Jan. 23, 2013.
460. Energy-inconsistent objective stress rates in ABAQUS, ANSYS, LS-DYNA and other FE codes: Magnitude of errors and how to correct them. GALCIT Colloquium, Caltech, Pasadena, CA, Feb. 1, 2013.
461. Sorption hysteresis and disjoining pressures in nanoporous solids, with implications for multi-decade creep and deflections of concrete bridges. Dept. of Mech. & Aerospace Engrg., University of California San Diego, La Jolla, Feb. 4, 2013.
462. Energy-inconsistent objective stress rates In ABAQUS, ANSYS, LS-DYNA and other fe codes: magnitude of errors and how to correct them. Techn. Univ. Vienna, March 23, 2013.

463. Probabilistic nano-mechanical theory of quasibrittle structure strength, crack growth, lifetime and fatigue. Mech. of Materials Special Seminar, Civil. Eng. Dept., Johns Hopkins University, Baltimore, April 26, 2013.
464. Probabilistic nano-mechanical theory of quasibrittle structure strength, crack growth, lifetime and fatigue. Politecnico di Milano, Dipt. di Ingegneria Civile e Ambientale. Milan, June 3, 2013.
465. Dynamic comminution of quasibrittle solids at high-rate shear under impact and analogy with turbulence, Seminar, Ecole Normale Supérieure. LMT-Cachan, France, Sept. 5, 2013.
466. Comminution of solids due to kinetic energy of high-rate shear: Missile impact, gas shale and turbulence analogy, Guest Seminar, Rodman Materials Laboratory, Aberdeen Proving Grounds, Adelphi, MD, Jan. 14, 2014.
467. Comminution of solids due to kinetic energy of high-rate shear: Missile impact, gas shale and turbulence analogy, Colloquia in Theoretical and Applied Mechanics, Northwestern University, Evanston, IL, Jan. 16, 2014.
468. Fiction about creep, size effect and safety in current design codes, Life Cycle Lecture Series, Dept. of Civil. Eng. and Natural Hazards, Univ. of Natural Resources and Applied Life Sciences (BOKU), Vienna, Austria, Mar. 21, 2014.
469. Comminution of solids due to kinetic energy of high-rate shear: Turbulence analogy, impact, shock and shale fracturing, Nečas Seminar on Continuum Mechanics, Mathematical Institute, Charles University, Prague, Mar. 31, 2014.
470. Comminution of solids due to kinetic energy of high-rate shearing: Implications for impact, shock and shale fracturing, Seminar, Concrete Sustainability Hub, MIT, Cambridge, MA, Apr. 30, 2014.
471. Probabilistic nano-mechanical theory of quasibrittle structure strength, crack growth, lifetime and fatigue. Guest Seminar. Mech. Eng. Dept., University of Massachusetts, Amherst, May 2, 2014.
472. Fracking technology, shale fragmentation and ideas to improve efficiency and mitigate environmental footprint. Frontiers in Geoscience Colloquia. LANL, Los Alamos, NM, Jun. 2, 2014.
473. Fracking technology, shale fragmentation and ideas to improve efficiency and mitigate environmental footprint. Seminar Series on Structural Engineering and Infrastructure Materials Series, Northwestern University, Evanston, IL, June 13, 2014.
474. The Ethics of Release of Data from Engineering Failures: Case Study of the Palau Bridge Collapse, Engrg. School Seminar, M.I.T., Nov. 13, 2014.
475. Impact Comminution of Concrete and Rock Due to Kinetic Energy of High-Rate Shear, Geomechanics Seminar, University of Minnesota, Minneapolis, Dec. 12, 2013.
476. Probabilistic Nano-Mechanical Finite Weakest-Link Model for Quasibrittle Structure Strength, Crack Growth, Lifetime and Fatigue, HKUST (Hong Kong Univ. of Sc. & Techn.), Institute of Advanced Study Lecture, Hong Kong, Jan. 8, 2015.
477. Impact Comminution of Concrete and Rock Due to Kinetic Energy of High-Rate Shear, Solid Mechanics Seminar Series, Institute of Solid Mechanics, School of Aeronautic Sci. & Eng., Beihang University (BUAA), Beijing, China, Jan. 13, 2015.
478. Why Fracking Works and Why Not Well Enough, Special Seminar in Structural Engineering, University of California, San Diego, San Diego, CA, Feb. 11, 2015.
479. Why Fracking Works and Why Not Well Enough, Mechanics Colloquium, University of Cambridge, Cambridge, UK, June 11, 2015.
480. New Results on Fracture of Woven Composites, with Application to Automobile Crush Cans, Project Report. Meeting of USCAR, Southfield, MI, Aug. 7, 2015.
481. Why fracking works and why not well enough, Department of Mechanics Seminar, ČVUT Prague, September 23, 2015.
482. Why fracking works and why not well enough, Special Seminar, Cullen College of Engineering, University of Houston, November 18, 2015.
483. To Frac or Not to Frac?—How Mechanics of Quasibrittle Hydraulic Fracture Can Sway the Answer, Structural Engineering and Infrastructure Materials Seminar Series, Northwestern University, March 2, 2016.
484. To Frac or Not to Frac?—How Mechanics of Quasibrittle Hydraulic Fracture Can Sway the Answer, Structural Engineering and Structural Mechanics Seminar Series, University of Colorado, Boulder, CO, March 31, 2016.
485. To Frac or Not to Frac?—How Mechanics of Quasibrittle Hydraulic Fracture Can Sway the Answer, T.U. Wien (Vienna University of Technology, Vienna), Austria, May 12, 2016.
486. Probabilistic Nano-Mechanical Finite Weakest-Link Model for Quasibrittle Structure Strength, Crack Growth, Lifetime and Fatigue, University of Bologna, School of Engineering and Architecture, Bologna, Italy, July 1, 2016.
487. To Frac or Not to Frac?—How Mechanics of Quasibrittle Hydraulic Fracture Can Sway the Answer, University of Bologna, School of Engineering and Architecture, Bologna, Italy, July 1, 2016.
488. Probabilistic Mechanics of Quasibrittle Structures: Strength, Lifetime and Scaling, Department of Civil Engineering Seminar, John Hopkins, Baltimore, MD, April 28, 2017.
489. Scaling of Quasibrittle Failure Probability & Fishnet Statistics for Nacreous Lamellar Structures, Civil Engineering Distinguished Seminar, UCI Samueli School of Engineering, Irvine, CA, June 8, 2017.

490. Quasibrittle Failure Probability and Scaling, Czech Society for Mechanics, Institute of Thermomechanics Seminar, Institute of Thermomechanics, Czech Academy of Sciences, Prague, June 15, 2017

491. Branching of Hydraulic Fractures in Shale and the Enigma of Preexisting Large-Scale Permeability, Learn about Hydraulic Fracking, Tufts University, Medford, MA, July 25, 2017

D. Invited Conference Lectures or Sectional Keynotes

1. Thermodynamics of interacting continua with surfaces and creep analysis of concrete structures, 1st Int. Conf. on Str. Mech. in Reactor Technology, West Berlin, Sept. 24, 1971.

2. A new approach to inelasticity and failure of concrete, sand and rock: endochronic theory, 11th Annual Meeting, Soc. of Eng. Science, Durham, N.C., Nov. 12, 1974.

3. Material inelasticity and failure in the design of concrete structures for nuclear reactors, 3rd Int. Conf. on Struct. Mech. in Reactor Techn., London, Sept. 1, 1975.

4. Material problems of prestressed concrete reactor vessels, 13th Annual Argonne U. Assn. Conf. on Nuclear Reactor Materials, Argonne, Natl. Lab., Aug. 7, 1975.

5. Pore pressure, uplift, and failure of concrete dams, Int. Comm. for Large Dams Symp. on Criteria and Assumptions for Analysis of Dams, University College, Swansea, U.K., Sept. 10, 1975.

6. Quest for a quantitative model of corrosion processes and thermal cracking in ocean concrete structures, 1st Int. Conf. on Behavior of Ocean Structures, Norwegian Inst. of Tech., Trondheim, Aug. 3, 1976.

7. Seismic effects on sand deposits, Int. Joint Petroleum Engineering, Pressure Vessels and Piping Conference, Mexico City, Sept. 21, 1976.

8. Micromechanics model for viscoelasticity of solidifying porous material - Concrete, 2nd Annual ASCE Eng. Mech. Div. Specialty Conf., Raleigh, N.C., May 26, 1977.

9. Material problems in accident analysis of prestressed concrete reactor vessels, 4th Int. Conf. on Struct. Mech. in Reactor Techn., San Francisco, Aug. 18, 1977.

10. Nonlinear deformations and failure of concrete, Opening Lecture at Seminar on Analysis of Reinforced Concrete Structures by Finite Element Methods, held in commemoration of 50th anniversary of School of Reinf. Concrete, Politecnico di Milano, Milano, Italy, June 20, 1978.

11. Transient analysis of LMFBR reinforced-prestressed concrete containment (with A. Marchertas and T. B. Belytschko), 5th Int. Conf. on Struct.

Mech. in Reactor Techn., West Berlin, Aug. 17, 1979.

12. Discussor's report on theme "Behavior of high strength concretes under various loadings," NSF Workshop on High Strength Concrete, Chicago, Dec. 2, 1979.

13. Instability of parallel thermal cracks and its consequences for hot dry rock geothermal energy, Int. Conf. on Thermal Stresses in Materials and Structures in Severe Thermal Environments, VPI, Blacksburg, VA, March 19, 1980.

14. Plastic-fracturing models for damage in geomaterials, NSF Workshop on Damage, U. of Cincinnati, May 6, 1980.

15. Endochronic models for soils: Predictor's Report, NSF/ASCE North American Workshop on Plasticity Theories and Generalized Stress-Strain Modeling of Soils, McGill University, Montreal, May 28, 1980.

16. Finite element analysis of concrete structures for time-dependent effects, Report of Str. Eng. Div. Task Comm., ASCE Annual Convention, Hollywood, Florida, Oct. 18, 1980.

17. Mathematical models for concrete inelasticity and their experimental basis, Workshop on Constitutive Relations for Concrete, Sandia Laboratories, Albuquerque, Apr. 18, 1981.

18. Advances in triaxial constitutive modeling of concrete, 6th Int. Conf. on Struct. Mech. in Reactor Technology, Paris, Aug. 17, 1981.

19. Application of fracture mechanics concepts in structural analysis of concretes and geomaterials, Invited Principal Lecture Intern. Seminar on Fracture Mechanics, org. by I.T.B.T.P., Saint-Rémy-lès-Chevreuses, France, June 11, 1982.

20. Constitutive relations for viscoplastic behavior of concrete, Invited Lecture at Workshop on Viscoplasticity, Los Alamos Scientific Laboratory, The Center for Material Science, Los Alamos, Sept. 1982.

21. Crack band propagation and stress-strain relations for fracture process zone in geomaterials, Invited Lecture at Intern. Symp. on Numerical Models in Geomechanics, ETH, Zürich, Sept. 16, 1982.

22. Fracture and damage in concrete, NSF Workshop on Mechanics of Damage and Fracture (chairman S. Atluri), Invited Lecture, Stone Mountain, Georgia, Nov. 22, 1982.

23. Progressive fracture of concrete and geomaterials, Intern. Conf. on Constitutive Laws for Engineering Materials: Theory and Application, Tucson, Arizona (C.S. Desai, chairman), Jan. 13, 1983.

24. Microplane model for fracture analysis of concrete structures (with B.-H. Oh), Symp. on the Interaction of Non-nuclear Munitions with Structures, Air Force Academy, Colorado Springs, May 10, 1983.

25. Probabilistic problems in prediction of creep and shrinkage effects in structures, 4th Intern. Conf. on Applications of Statistics and Probability in Soil and Structural Engng., Florence, June 14, 1983.

26. Fracture and micromechanics of strain-softening of heterogeneous brittle materials, International Colloquium on Failure Criteria of Structured Media, Villars-de-Lans (Univ. of Grenoble), France, June 23, 1983.
27. Plasticity and microfracturing of brittle aggregate materials (Topical Lecture), Plasticity Today, Intern. Symp. dedicated to W. Olszak, Udine, Italy, June 27, 1983.
28. Fracture in concrete and reinforced concrete, Theme IV Lecture at W. Prager IUTAM Symposium on Mechanics of Geomaterials: Rocks, Concretes, Soils, Northwestern University, Sept. 13, 1983.
29. Determination of nonlinear fracture parameters from size effect tests, Theme III Lecture at NATO Advanced Research Workshop on Application of Fracture Mechanics to Cementitious Composites, Northwestern University, Sept. 5, 1984.
30. Numerical simulation of progressive fracture in concrete structures: Recent developments, Opening Lecture, Int. Conf. on Computer-Aided Analysis and Design of Concrete Structures, Split, Yugoslavia, Sept. 17, 1984.
31. Imbricate continuum and progressive fracturing of concrete and geomaterials, Invited Lecture, Conf. on Progress of Structural Analysis since Castigliano—Centenary of A. Castigliano's Death, Politecnico di Torino, Oct. 11, 1984. Also, Panel Discussion on Origins and Trends of Modern Struct. Mech., same, Oct. 11, 1984.
32. Fracture mechanics and strain softening of concrete, Principal Lecture, U.S. - Japan Seminar on Finite Element Analysis of Reinforced Concrete, Architectural Institute of Japan, Tokyo, May 20, 1985.
33. Effect of cracking in drying creep of concrete, U.S.-Japan Seminar, Japan Soc. of Civil Engrs., May 23, 1985.
34. Distributed cracking and nonlocal continuum, Europe-U.S. Symposium on Finite Element Methods for Nonlinear Problems, Trondheim, Norway, Aug. 12, 1985.
35. Nonlocal continuum approach to strain-softening and distributed cracking, SMiRT8, 8th Intern. Conf. on Struct. Mechanics in Reactor Technology, Brussels, Aug. 20, 1985.
36. Mathematical modeling of creep and shrinkage of concrete, Committee Report Presentation, 39th RILEM Annual Meeting, NBS, Washington, Sept. 25, 1985.
37. Material models for creep and shrinkage, State-of-Art Lecture, 4th RILEM Intern. Symp. on Creep and Shrinkage of Concrete: Mathematical Modeling, Northwestern University, Aug. 26, 1986.
38. Impact of Robert L'Hermite's ideas on the evolution of creep and shrinkage theory, Memorial Lecture, 4th Intern. Symp. on Creep and Shrinkage of Concrete: Mathematical Modeling, Northwestern University, Aug. 26, 1986.
39. Strain-softening continuum damage: Localization and size effect (co-author: T. Belytschko) (Invited Lecture), 2nd Intern. Conf. on Constitutive Laws for Engineering Materials, Tucson, AZ., Jan. 7, 1987.
40. Distributed cracking and fracture of concrete and rock, Colloquium on Cracking and Fracture, Tohoku University, Sendai, Japan. Feb. 2, 1987.
41. Problems and recent advances in continuum modeling of softening damage (opening lecture), AFOSR Workshop on Constitutive Equations and Modeling of Distributed Cracking, Strain-Softening and Localization, Inst. of Mathematics and Its Applications, Univ. of Minnesota, Minneapolis, Feb. 16, 1987.
42. Yield limit degradation: Nonlocal continuum model with local strain (co-authors F.-B. Lin and G. Pijaudier-Cabot), Invited Opening Lecture, Int. Conf. on Computational Plasticity (COMPLAS-1),, Barcelona, Spain, Apr. 6, 1987.
43. Fracture energy of heterogeneous materials and similitude, Invited Lecture, Intern. Conf. on Fracture of Concrete and Rock, Wyndham Hotel, Greenspoint, Houston, June 18, 1987.
44. Distributed damage and application of nonlocal and microplane effects (co-authors G. Pijaudier-Cabot and P. C. Prat), 9th Int. Conf. on Struct. Mech. in Reactor Technology (SMiRT), Lausanne, Aug. 17, 1987.
45. Nonlocal damage, Invited lecture at NSF Mechanics, Structures and Material Engineering Division Program Review Meeting, Washington, D.C. March 15, 1988.
46. Brittleness and size effects in concrete structures, Engineering Foundation Conference on Advances in Cement Manufacture and Use, Potosi, Missouri, Aug. 1, 1988.
47. Stable states and stable paths of propagation of damage zones: Inelastic stability criteria with applications, France-US Workshop on Strain Localization and Size Effect Due to Cracking and Damage, sponsored by NSF and CNRS, held at Ecole Normal Supérieure, Cachan, France, September 7, 1988.
48. Concrete fracture models and experimental determination of fracture properties (state-of-art lecture), ACI Fall Convention, Houston, Texas, November 2, 1988.
49. Stable path of interacting crack systems and micromechanics of damage, co-authored with M. R. Tabbara and M. T. Kazemi, Seventh International Conference on Fracture (ICF 7), Westin Galleria Hotel, Houston, March 22, 1989.
50. Stable propagation of interacting crack systems and modeling of damage, co-authored with M. R. Tabbara, invited lecture in Division of Concrete and Nonmetallic Materials, 10th International Conference on Structural Mechanics in Reactor Technology, Anaheim, California, August 14, 1989.
51. Recent studies of size effect in concrete structures, co-authored with M. T. Kazemi and R. Gettu,

- invited lecture in Division of Concrete structures, *ibid.*, August 16, 1989.
52. Bifurcations and thermodynamic criteria of stable paths of structures exhibiting plasticity and damage propagation, 2nd. Int. Conf. on "Computational Plasticity (COMPLAS-2)," Barcelona, Spain, September 18, 1989.
53. Particle model for brittle composite material (co-author: M. R. Tabbara), 3rd Int. Conf. on Advances in Numerical Methods in Engineering (NUMETA '90) Swansea, Wales, U.K., January 11, 1990.
54. Geometric damage tensor uncoupled from constitutive properties of strain-softening materials (co-author: I. Carol), Symposium on Theoretical, Experimental, and Computational Problems Related to Concrete, Rock and Soils at 15th Northeastern Conference on Theoretical and Applied Mechanics, OMNI Hotel, Atlanta, March 23, 1990.
55. Nonlocal microplane model: tensile and compressive fractures and triaxial damage (co-author: J. Özbolt), 2nd Int. Conf. on Computer Aided Analysis and Design of Concrete Structures (EURO-C). Zell-am-See, Austria, April 5, 1990.
56. Fracture mechanics size effect and damage localization in brittle homogeneous materials, NATO Advanced Research Workshop on Toughening Mechanisms in Quasi-Brittle Materials, Northwestern University, Evanston, June 17, 1990.
57. Size effect in fracture of dam concrete and influence of loading rate and duration, Research Workshop on "Application of Fracture Mechanics in Dam Engineering", Locarno, Switzerland (org. by F.H. Wittmann and Roy Dungan), Sept. 18, 1990.
58. Size effect in quasi-brittle micro-heterogeneous structures: deterministic and statistical theories, Int. Workshop on the Applications of Fracture Mechanics in Reinforced Concrete, held at Politecnico di Torino, Italy (org. by A. Carpinteri), Oct. 6, 1990.
59. Nonlocal behavior of quasi-brittle materials, ONR Sea Ice Mechanics Workshop (org. by T. Curtin, Office of Naval Research, Washington), held at Airlie, VA, Nov. 13, 1990.
60. Recent progress in damage modeling: Non-locality and its microscopic cause, 3rd Int. Conference on Constitutive Laws for Engineering Materials: Theory and Applications (org. by C.S. Desai and E. Krempl), Tucson, AZ, Jan. 9, 1991.
61. Fracture mechanics of concrete, U.S.-Japan Workshop on Finite Element Analysis of Reinforced Concrete Structures (org. by C. Meyer), Columbia University, New York, June 3, 1991.
62. Fracture mechanics of quasi-brittle structures: recent advances, 11th Int. Conference on Structural Mechanics in Reactor Technology (SMiRT 11), Keio Plaza Hotel, Tokyo, Aug. 20, 1991.
63. Rate and size effects in concrete failure: implications for dams, Int. Conference on Dam Fracture, University of Colorado, Boulder, September 12, 1991.
64. Fracture of ice: Current status, ONR Ice Workshop, Eatonsville, Washington (org. by T. Ewart), Applied Physics Laboratory, University of Washington, Seattle, December 5, 1991.
65. Microplane model for damage in concrete, Scandinavian Workshop on Materials Models for Fracture and Damage in R.C. Structures, Hotel Actif, (org. by P. Bergan), Det Norske Veritas, Oslo, Norway, February 14, 1992.
66. Fracture models for concrete and size effect, *ibid.*, February 15, 1992.
67. New concept of nonlocal continuum damage: Crack influence function, Symposium on Macroscopic Behavior of Heterogenous Materials from the Microstructure, 113th ASME Winter Annual Meeting, Hilton, Anaheim, California, November 12, 1992.
68. Fracture analysis of penetration through floating sea ice plate and size effect, Symposium on Ice Mechanics, ASCE-ASME-SES Joint Mechanics Conference (MEET '93), University of Virginia, Charlottesville, VA, June 9, 1993.
69. Micromechanics-based continuum model for fracture of damaging materials (with M. Jirásek), Symposium on Material Mechanics, ASCE-ASME-SES Joint Mechanics Conference (MEET '93), University of Virginia, Charlottesville, VA, June 9, 1993.
70. Public funding of university research and graduate programs, Centennial Annual Conference, American Society for Engineering Education, University of Illinois, Urbana, IL, June 21, 1993.
71. Preliminary guidelines and recommendation for characterizing creep and shrinkage in structural design (with RILEM Committee TC 107), ConCreep 5 (5th RILEM International Symposium on Creep and Shrinkage of Concrete), Barcelona, Sept. 7, 1993.
72. Solidification theory: A rational and effective framework for constitutive modeling of aging viscoelasticity (presented by co-author I. Carol), ConCreep 5 (5th RILEM International Symposium on Creep and Shrinkage of Concrete), Barcelona, Sept. 8, 1993.
73. Nonlocal damage concept based on interaction of propagating microcracks, IUTAM Symposium on Fracture of Brittle Disordered Materials: Concrete, Rock and Ceramics, University of Brisbane, Australia, Sept. 24, 1993.
74. Creep and thermal effects in concrete structures: A conspectus of some new developments, EURO-C 1994 (International Conference on Computational Modeling of Concrete Structures), Innsbruck, March 23, 1994.
75. Cohesive crack model for geomaterials: stability analysis and rate effect (co-author Y. N. Li), 12th U.S. Congress of Applied Mechanics, University of Washington, Seattle, WA., June 27, 1994.
76. Scaling of cohesive fracture (with Y.-N. Li),

IUTAM Symposium on "Size-Scale Effects on Failure Mechanics of Materials and Structures", Politecnico di Torino, Torino, Italy, October 3, 1994.

77. Concrete creep and shrinkage prediction models for design codes: recent results and future directions (with S. Baweja), International RILEM Workshop on "Technology Transfer of the New Trends in Concrete" (ConTech, 94), Technical University of Catalunya, Barcelona, Spain, November 8, 1994.

78. Scaling of quasibrittle fracture, Workshop on Scaling Aspects of Hardened Structures Testing, Sandia Laboratories, Albuquerque, New Mexico, January 25, 1995.

79. Influence of specimen or structure size on measured fracture parameters, Position Paper of Working Group 3, Workshop on Standards for Measurement of Mode I Fracture Properties of Concrete, University of Wales, Cardiff, U.K., July 20, 1995.

80. Scaling of compression fracture of quasibrittle materials. Ballesteros Symposium, 5th Pan American Congress of Applied Mechanics (PACAM 5), San Juan (Marriott), Puerto Rico, January 3, 1997.

81. Size effect in quasibrittle fracture: Some recent advances. Invited Principal Lecture. 9th Int. Conf. on Fracture, Sydney, Australia, April 1, 1997.

82. Compression fracture: Mechanics of damage localization and size effect. Invited Lecture, IUTAM Symposium on Material Instabilities, Delft University of Technology, Delft, Netherlands, June 10, 1997.

83. Size effect in compression fracture, 2nd EURO-Conf. on Material Instabilities in Deformation and Fracture, held at AUT, Thessaloniki, Greece (chair E.C. Aifantis), Sept. 3, 1997.

83. Creep and shrinkage prediction model for analysis and design of concrete structures (Model B3) (presented by co-author S. Baweja), ACI Convention, Atlanta, GA, Nov. 10, 1997.

84. Scaling of tensile and compressive brittle failures of heterogeneous composites: problems and progress. ARO Workshop on Mechanics of Heterogeneous Structures, Army Research Office, Research Triangle, Durham, North Carolina, March 11, 1998.

85. Rational prediction of creep and shrinkage of concretes, ACI Paris Chapter Workshop on Creep and Shrinkage in Concrete Structures, held at LCPC, Paris, April 6, 1998.

86. Fracture and scaling of failure of composites: critical issues, 6.1/6.2 Workshop, Office of Naval Research, Naval Surface Warfare Center, Carderock, Maryland, May 6, 1998.

87. Scaling problems of damaging materials and size effect laws: Conspectus of recent results. Keynote (Sectional) Lecture. 7th Inter. Symp. on Plasticity and Its Current Applications, held in Cancún, Mexico, Jan. 6, 1999.

88. Scaling of compression fracture of fiber composites, Sandwiches and other quasibrittle materials. 6.1/6.2 Workshop, Office of Naval Research, Naval

Surface Warfare Center, Carderock, Maryland, April 28, 1999.

80. Spatially and directionally discrete computational models for fracturing-plastic materials with size effects in tension and compression, Workshop on Computational Exploration of Discrete Media, US Army Corps of Engineers, Waterways Experiment Station, Vicksburg, Mississippi, Nov. 9, 1999.

81. Probabilistic nonlocal theory for quasibrittle fracture initiation and size effect (co-author: D. Novák), Symposium Honoring Professor Alfredo H.-S. Ang, University of Illinois, Urbana, May 20, 2000.

82. Scaling laws for brittle failure of sea ice. IUTAM Symp. on Ice Mechanics and Ice Dynamics, University of Alaska, Fairbanks, June 15, 2000.

83. Struggle and thrill in a quest to prevent fracture and collapse of structures, 20th Anniversary World Congress ("Civil Society and democracy into the new millenium"), Czechoslovak Society of Arts and Sciences (Společnost pro vědu a umění, SVU), American University, Washington, D.C., August 10, 2000.

84. Energetic probabilistic size effect, its asymptotic properties and numerical applications (co-author D. Novák), keynote sect. lecture, Eur. Congr. on Computational Methods in Applied Sci. and Engrg. (incl. COMPLAS-6), Barcelona, Sept. 13, 2000.

85. Size effect in fracture of fiber composites and sandwich plates (co-author M. Brocca), invited 1 hour lecture. Workshop on Recent Advances in Continuum Damage Mechanics for Composites, Lab. of Mech. & Technol., ENS de Cachan, France, Sept. 22, 2000.

86. Nonlocal and gradient theories of plasticity and damage (with M. Jirásek), principal symposium lecture, 37th Annual Techn. Meeting, Society of Engrg. Science, Univ. of South Carolina, Columbia, SC., Oct. 24, 2000.

87. Lessons from Structural Disasters, Banquet speech. NSF Long-Term Durability Workshop, UC Berkeley, Oct. 26, 2000.

88. Fracture scaling of composites. Opening lecture (1 1/2 hour). Federal Aviation Administration Composite Structural Development Workshop, Renton, WA, Nov. 29, 2000.

89. Size effects in quasibrittle fracture: survey of new results and consequences for practice. Invited Lecture. Post-FraMCoS-4 Workshop on Size/Scale Effects, ENS de Cachan, France, June 1, 2001.

90. Scaling in solid mechanics: from nano to mega. Opening keynote lecture. Int. Conf. on Composites in Material and Structural Engineering (80th Anniversary of Klokner Institute), Prague, June 4, 2001.

91. Nonlocal and gradient theories of plasticity and damage (with M. Jirásek), principal symposium lecture, US National Congress of Computational Mechanics, Ann Arbor, Michigan, August 1, 2001.

92. Fracture testing based on maximum loads. NSF-ACI Comm. 446 Workshop to Select a Fracture Toughness Test Standard for Concrete, chaired by W. Gerstle, Captiva Island, Florida, November 19, 2002.
93. Asymptotic scaling in gradient plasticity, 9th Int. Symp. on Plasticity and Its Current Applications (PLASTICITY'02, A.S. Khan, chair), sectional keynote lecture, Aruba, Jan. 5, 2002.
94. Scaling of concrete creep and durability. Invited lecture at Gordon Conference on Chemistry and Physics of Cement-Based Materials (J. Beaudoin, chair), Ventura Beach Hotel, Ventura, California, March 6, 2002.
95. Vertex effect and confinement of fracturing concrete via microplane model M4. Invited lecture at Symposium on 'Materials Science to Applications—A Tribute to Surendra P. Shah'. Detroit (Marriott Renaissance Center), April 22, 2002.
96. Scaling aspect of material durability problems. NSF Advanced Workshop on Model-Based Simulation of Durability of Materials and Structures, chaired by ZP Bazant, Y. Xi, G. Pijaudier-Cabot and Z. Bittnar, Czech Technical University, Prague, July 4, 2002.
97. Computational and analytical approaches to scaling in solid mechanics: From nano to mega. Sectional keynote lecture, 5th World Congress on Computational Mechanics, TU Wien, Vienna, July 9, 2002.
98. Shear buckling of fiber composites and sandwich structures: Paradox resolved (with A. Beghini), 14th Int. Conf. on Composite Materials (ICCM), San Diego (Manchester Hyatt Regency Hotel), July 14, 2003.
99. Quasibrittle fracture scaling: Bridging from meso to macro. NSF-FHWA Workshop on Imaging and Simulation of Concrete Microstructure (Nano to Mesoscale), S.P. Shah, chairman, Northwestern University, July 31, 2003.
100. Size effect as a desideratum for future design codes for concrete structures. Edwin C. Rossow Symposium on "Structural Engineering: Future Trends". Northwestern University, Oct. 4, 2003.
101. Fracture-based reliability design of concrete structures and size effect. US-Japan-Europe Workshop on Simulation of Collapse of Concrete Structures: from Research to Practice. Makena, Maui (Maui Prince Hotel), Hawaii, Nov. 3, 2003.
102. Fracture analysis and size effects in failure of sea ice and snow. Kerr Symposium on Engineering Mechanics (honoring Prof. Arnold Kerr). University of Delaware, Newark, Apr. 30, 2004.
103. Energetic-statistical size effect in composites and sandwich structures (plenary symposium lecture). ICCES04 (Int. Conf. on Computational & Experimental Engineering & Sciences), Symposium on Composites: Experiment and Analysis, Madeira (Savoy Resort), Portugal, July 27, 2004.
104. Fracture scaling of quasibrittle composites and thin films: New asymptotic matching approach, 16th ALERT Geomaterials Workshop (Alliance of Laboratories in Europe for Research and Technology), Aussois, France, Oct. 14, 2004.
105. Boundary layer and strain-gradient models for size effects in thin metallic films and nanocomposites (co-authors Z. Guo and H. Espinosa), Plasticity 2005, Conf. in Kauai, Hawaii, Jan. 4, 2005.
106. Size dependence of pdf of quasibrittle structure strength and consequences for reliability, Sectional Keynote Lecture (co-author S. pang), 2005 Joint ASME/ASCE/SES Conf. on Mechanics of Materials (MacMat2005), Baton Rouge, Louisiana, June 1, 2005.
107. Energetic-probabilistic size effects in cohesive fracture and asymptotic matching, Conference on Friction, Fracture and Earthquake Physics, Kavli Institute of Theoretical Physics, University of California, Santa Barbara, August 16, 2005.
108. Reliability of fracturing concrete structures and challenges of stochastic finite element modelling (co-authors S.-D. Pang and P. Grassl), Invited Sectional Lecture, Computational Plasticity VIII (COMPLAS-8), Barcelona, Sept. 7, 2005.
109. Microplane model M5f for multiaxial behavior and fracture of fiber reinforced concrete (co-authors A. Beghini, Y. Zhou, O. Gouirand and F.C. Caner), Opening Lecture, Symp. on Developments in High Performance Cement and Fiber Reinforced Composites, Indian Institute of Science, Bangalore, India, Dec. 13, 2005.
110. The mechanics of the World Trade Center towers collapse: What can we learn? Sectional Keynote Lecture, U.S. National Congress of Theor. & Appl. Mech. , University of Colorado, Boulder, June 26, 2006.
111. Microplane modeling of damage or fracture and multiscale modeling concepts. Invited Opening Sectional Lecture (dedicated to Liviu Librescu, in memoriam), 18th Engrg. Mechanics Division Conf. ASCE, Blacksburg, VA, June 5, 2007.
112. Microplane modeling of damage or fracture and multiscale concepts. Invited sectional opening lecture, ECCOMAS Thematic Conference on "Modelling of Heterogeneous Materials" (MHM 2007). Czech Technical University, Prague, June 26, 2007.
113. Comparison of prediction models and design approaches for creep and shrinkage of concrete, ACI Fall Convention, Fajardo, Puerto Rico, Oct. 15, 2007.
114. Size effect on shear strength of reinforced concrete: Fracture mechanics approach. April 1, 2008, ACI Spring Convention, Los Angeles (Hyatt Regency Century Plaza).
115. Size effect on strength and lifetime distributions of quasibrittle structures, implied by interatomic bond break activation (co-author J.-L. Le).

Stein Sture Symposium on Geomechanics, Inaugural Int. Conf. of the Engineering Mechanics Institute (em08) ASCE, May 19, 2008, University of Minnesota, Minneapolis.

116. Microplane modeling of damage and fracturing in particulate and fiber composites and biomaterials. Opening lecture of Symp. on Advances in Computational Mechanics in Honor of Prof. Maier, 8th World Congress on Computational Mechanics (WCCM8), June 30, 2008, Venice-Lido, Italy.

117. Strength of quasi-brittle ceramics: Impossibility of finite Weibull threshold and statistical justification in nano-mechanics (with J.-L. Le, S.-D. Pang) Soc. of Engrg. Science 45th Annual Techn. Meeting (Eringen Medal Symp. honoring S. Suresh), Univ. of Illinois, Urbana, Oct. 13, 2008.

118. Plastic-fracturing transition of size effect in fiber composites (with Q. Yu, J.-L. Le, C.G. Hoover and F.C. Caner), 15th Int. Symp. on Plasticity and Its Current Applications, held in St. Thomas (chaired by A.S. Khan), US Virgin Islands, Jan. 4, 2009.

119. Atomistic fracture and nano-macro transition for strength and lifetime of quasibrittle structures, Sectional Keynote Lecture, 12th Int. Conf. on Fracture (ICF12), Ottawa, Canada, July 15, 2009.

120. Quasibrittle size effect: Problems and Progress, Sectional Keynote Lecture, 12th Int. Conf. on Fracture (ICF12), Ottawa, Canada, July 16, 2009.

121. Scaling of quasibrittle fracture: Apercu of main results and recent advances, Keynote Lecture, Theocaris Symp. on Recent Advances in Mechanics, Athens, Greece, Sept. 17, 2009.

122. Scale effects and uncertainties. Invited Lecture. Ground Shock in Faulted Media Workshop, DTRA (Defense Threat Reduction Agency), SAIC Conf. Center, Tysons Corner, VA, Jan. 11, 2010.

123. Multiscale nano-macro transition for strength and lifetime statistics of quasibrittle structures (co-author J.-L. Le). Workshop "Continuing Damage ..." in Honor of Prof. Jacky Mazars, Rohrmoos/Schladming, Austria, March 14, 2009.

124. Probabilistic theory of static and cyclic fatigue lifetime of quasibrittle structures based on nano-mechanics. Rice Symposium (Symp. of Mechanics in Geophysical and Materials Sciences honoring James R. Rice at his 70th birthday). California Institute of Technology, Pasadena, CA, Jan. 20, 2011.

125. Sealing of data from structural failures and damages: Hindrance to progress. 21st Meeting of the National Academies Committee on Science, Technology and Law, Washington, DC, April 11, 2011.

126. Problems of boundary conditions in non-local and cohesive models for material damage and quasibrittle fracture. Sectional Keynote Lecture, CFRAC 11 (Computational Modeling of Fracture and Failure of Materials and Structures), UPC

Barcelona, June 6, 2011.

127. Wake-up call for creep, myth about size effect and black holes in safety: What to improve in *fib* Model Code draft. Theme II keynote Lecture, *fib* Symposium Prague 2011 "Concrete Engineering for Excellence and Efficiency", Prague (Hotel Clarion), June 8, 2011.

128. Panel discussion on "Infrastructure—Past, Present and Future", Dept. of Civil & Env. Engineering, Northwestern University, Apr. 29, 2011.

129. Microplane model M6f for concrete. Sectional Keynote Lecture, USNCCM-11 (11th U.S. Nat. Congr. of Computational Mechanics), Minneapolis (Hilton), July 25, 2011.

130. Correct work-conjugate stress and strain measures for accurate numerical modeling of finite deformation. Sectional Keynote Lecture, USNCCM-11 (11th U.S. Nat. Congr. of Computational Mechanics), Minneapolis (Hilton), July 27, 2011.

131. Mechanisms of sorption hysteresis and discrete disjoining pressure effects in nano-porous solids (co-author M.Z. Bazant), Prager Medal Symp. in honor of Prof. T.B. Belytschko, 48th Annual Tech. Conf. of the Society of Engrg. Science, Northwestern University, Oct. 12, 2011.

132. Failure of large laminate-foam sandwich plates: effects of size, cohesive fracture with imperfections, and finite strain (Sectional Keynote). ASME Intern. Mech. Engrg. Congress, Nov. 12, 2012, Houston, TX

133. Dynamic comminution of quasibrittle solids at high-rate shear under impact and analogy with turbulence. Sectional Keynote. EMI 2013 (ASCE Engrg. Mechanics Institute Conf.), Northwestern University, Evanston, IL, August 6, 2013.

134. Multi-decade creep and shrinkage of concrete (Report of TC 242-MDC), 67th RILEM Week, held at Les Cordeliers, Paris, France, Sept. 3, 2013.

135. Impact comminution of quasibrittle materials under high-rate shear: continuum model and turbulence analogy, Sectional Keynote lecture, 20th Int. Symposium on Plasticity and its Current Applications, Freeport, Bahamas, Jan. 3, 2014.

136. Solid comminution due to kinetic energy of high-rate shear: Turbulence analogy, impact, shock and shale fracturing. Sectional Keynote, 20th European Conference on Fracture (ECF20), Trondheim, Norway, Jul. 1, 2014.

137. Comminution of solids due to kinetic energy of high-rate shearing: Impact, shock and shale fracturing. Sectional Keynote in John Rudnicki Symposium, Engrg. Science Medalist, 51st Annual Technical Meeting, Purdue University, West Lafayette, IN, Oct. 3, 2014.

138. Comminution of Solids Due to Kinetic Energy of High-Rate Shearing: Impact, Shock and Shale Fracturing (Sectional Keynote), Society of Engineering Science Annual Meeting, Purdue University, Oct. 3, 2014

139. Stability of Distributed Hydraulic Fractures against Localization: A Fundamental Problem in Fracking of Gas Shale (Sectional Keynote), Conf. on Computational Modeling of Fracture and Failure of Materials and Structures (CFRAC-4) 2015, Paris-Cachan, France, June 5, 2015.
140. Crack Band Approach to Complex 3D Hydraulic Fracturing of Gas Shale (Sectional Keynote), ASCE Eng. Mech. Inst. Conf. (EMI), Stanford University, Stanford, CA, June 18 2015.
141. Stability of Distributed Hydraulic Fractures against Localization: A Fundamental Problem in Fracking of Gas Shale, ASME International Mechanical Engineering Congress & Exposition (IMECE), Houston, TX, November 16, 2015.
142. Two advances in quasibrittle fracture mechanics: fracking simulations and testing of post-peak in composites, opening principal lecture, 2nd Midwest Workshop on Mechanics of Materials and Structures, Northwestern University, Evanston, IL, August 15, 2016.
143. Two advances in quasibrittle fracture mechanics: fracking simulations and testing of postpeak in composites, J. Rosakis 60th Birthday, Brown University, September 16, 2016
144. Multiscale computational modeling, NASA STRI Workshop, Northwestern University, Evanston, IL September 14, 2016.
145. Simulation of hydraulic fracture in shale: crack branching and spherocylindrical orthotropic microplane constitutive model, Symposium Honoring G.I Barenblatt at his 90th Birthday, 14th International Congress of Fracture, Rhodes, Greece, June 20, 2017
146. The enigma of large-scale permeability of gas shale: preexisting or frac-induced?, Prager Medal Symposium Honoring Y. Huang, 54th Annual Technical Meeting, SES 2017, Northeastern University, Boston, MA, July 26, 2017
11. Effects of concrete creep under repeated stresses superposed on sustained stresses, 8th Congress IABSE, New York, Sept. 11, 1968.
12. The art of bridge building, Summer Institute, Northwestern University, July 29, 1970, repeated July 27, 1971.
13. Drying of concrete as a nonlinear diffusion problem, Conference on Frontiers of Research in Concrete, Allerton Park, Illinois, Sept. 10, 1970.
14. Thermodynamic theory of deformations of concrete with explanation of drying creep, ASCE-EMD Specialty Conference on Mechanics Research in Civil Engineering, Univ. of Illinois, Urbana, Jan. 29, 1971.
15. Runge-Kutta methods for initial boundary value problems of nonlinear creep, elasto-plasticity and viscoelasticity, *ibid.*, Jan. 29, 1971.
16. Numerical analysis of nonlinear creep of plates, 3rd Canadian Congress of Applied Mechanics, Univ. of Calgary, May 21, 1971.
17. Micropolar medium as a model for buckling of grid frameworks, 12th Midwest Mechanics Conference, Univ. of Notre Dame, Aug. 17, 1971.
18. Numerically stable algorithm for integral-type aging creep, 1st Conf. on Struct. Mech. in Reactor Technology, West Berlin, Sept. 24, 1971.
19. Finite element analysis for nonlinear or time-dependent materials, Conf. on Computational Aspects of Finite Element Method, Institute for Statics and Dynamics, Technical University Stuttgart, Sept. 28, 1971.
20. Correlation study of formulations of incremental deformation and stability of continuous bodies, ASME Meeting, Washington, D.C., Dec. 1, 1971.
21. Continuous approximation of large regular frameworks (co-authored with M. Christensen), Symp. on Response of Buildings to Lateral Forces, ACI Annual Meeting, Dallas, March 10, 1972.
22. Surface diffusion theory for the drying creep effect, Am. Ceramic Society 74th Annual Meeting, Wash., D.C., May 10, 1972 (co-author Z. Moschovidis).
23. Three remarks on viscoelasticity and inelasticity of concrete, 9th Congress IABSE, Amsterdam, May 1972 (presented by a colleague).
24. Large deflections in spatial buckling of thin-wall beams and frames (with M. ElNimeiri), ASCE Annual Meeting, Houston, Oct. 16, 1972.
25. Thermoviscoelasticity of aging concrete (with S. T. Wu), ACI Convention, Hollywood, Fla., Nov. 2, 1972.
26. Stress singularity at corners or terminations of crack edges: a general method, ASME Symp. on Fracture and Flaws, Albuquerque, N.M., March 2, 1973.
27. Thermoviscoelastic stress-strain relations for chemically changing materials (with S. T. Wu), 4th Canadian Congr. of Appl. Mech. Montreal, June 1, 1973.

E. Contributed Conference Papers

1. Application of relaxation method with variable load term to analysis of skew plates (presented in German), Deutsch-Tschechoslovakischen Hochschultage, Technische Hochschule Dresden, Oct. 7, 1959.
- 2.-8. At least seven papers at conferences in Czechoslovakia, between 1960 and 1966, presented in Czech, Russian, German and English (ČS-VTS Prague, SU-CVUT Conf. Prague, EquaDiff, Prague, Brno, Bratislava, Žilina, Smolenice, etc.).
9. New model for rheologic properties of glass-reinforced plastics (presented in German), 1st Int. Conf. on Fiber-Reinforced Plastics and Resins, East Berlin, 1965.
10. Rheologic models for synthetic resins (presented in French), Journées de Recherche de l'I.T.B.T.P., Feb. 1967.

28. A thin-wall cement paste specimen for creep tests at variable humidity and temperature (J. H. Hermann, H. Koller, L. J. Najjar) ASTM Annual Meeting, Philadelphia, Jun. 25, 1973.
29. Creep of concrete at elevated temperature (with S. T. Wu), ASCE Annual Meeting, New York, Oct. 30, 1973.
30. Singular finite element for dynamics of elastic solids with cracks, 10th Anniv. Meeting, Soc. of Eng. Science, Raleigh, N.C., Nov. 6, 1973.
31. Nonlinear creep, cracking and large buckling deflections of plates and shells by finite elements, 10th Anniv. Meeting, Soc. of Eng. Science, Raleigh, N.C., Nov. 7, 1973.
32. Experimental study of creep and shrinkage of hardened cement paste at quasi-equilibrium humidity changes (with A. Asghari), Am. Ceramic Soc. Annual Meeting, Chicago, April 29, 1974.
33. Three-dimensional harmonic functions near termination or intersection of gradient singularity lines, 7th U. S. Natl. Cong. of Appl. Mech., Boulder, CO, June 4, 1974.
34. A new approach to inelasticity and failure of concrete, sand, and rock: endochronic theory, Soc. of Eng. Science 11th Annual Meeting, Duke Univ. Durham, N.C., Nov. 12, 1974.
35. Elastodynamic near-tip stress and displacement fields for rapidly propagating cracks in orthotropic materials, with J. D. Achenbach (presented by J.D.A.), Western Mech. Conf., U. of Hawaii, Honolulu, March 26, 1975.
36. Densification compliance and tangent moduli of fluid saturated sand, ASCE Nat. Struct. Eng. Convention, New Orleans, April 15, 1975.
37. Endochronic constitutive law for inelastic shear and densification of sand, with R. J. Krizek, 5th Canadian Congr. of Appl. Mech., Fredericton, N.B., May 27, 1975 (presented in absence by F. Bercha).
38. Finite element solution of geothermal energy extraction, with S. Nemat-Nasser and H. Ohtsubo (by S. Nemat-Nasser), NSF Workshop on Geothermal Energy, Stanford Univ., Dec. 17, 1975.
39. High temperature effects on nuclear concrete structures in accident situations, ACI Annual Convention, Philadelphia, April 2, 1976.
40. Prediction of nonlinear behavior of concrete members under seismic loading, ASCE Eng. Mech. Div. Specialty Conf., U. of Waterloo, Ont., Canada, May 26, 1976.
41. Elasto-dynamic stress intensity factors at stationary and running cracks: A finite element approach, 14th Int. Congr. of Theoretical and Applied Mechanics (IUTAM) Delft, Aug. 31, 1976 (prepared with J. Glazik).
42. Prepared discussion on intrinsic time theories at NSF Workshop on Applied Thermoviscoplasticity at Northwestern University, Oct. 14, 1975.
43. Hydraulic fracture and heat extraction from hot dry rock masses (with S. Nemat-Nasser), 2nd Int. Conf. on Num. Methods in Geomechanics, VPI, Blacksburg, VA, June 1976.
44. Three-dimensional singularities in cracked elastic solids (presented by co-author L. F. Estenssoro), 15th Midwestern Mechanics Conf., Univ. of Illinois at Chicago Circle, March 25, 1977.
45. Stability and spacing of cracks due to cooling or shrinkage (co-authored with H. Ohtsubo), 2nd Annual ASCE Engng. Mech. Div. Specialty Conf., N.C. State U., Raleigh, May 29, 1977.
46. General numerical method for three-dimensional singularities in cracked elastic solids (co-authored with L. F. Estenssoro), 4th Int. Conf. on Fracture, Univ. of Waterloo, Canada, June 21, 1977.
47. Extension of HCDA safety analysis to large PCRV containment structures (presented by co-author A. H. Marchertas), 4th Int. Conf. on Struct. Mech. in Reactor Tech., San Francisco, Aug. 18, 1977.
48. Discussion on practical prediction of creep, RILEM Symposium on Creep (attendance by invitation only), Univ. of Leeds, April 20-21, 1978.
49. Angle of propagation of a crack intersecting a surface of a two-material interface, 8th Nat. Congr. of Appl. Mech., UCLA, Los Angeles, June 27, 1978 (with L. F. Estenssoro).
50. Similarities of moisture and thermal effects in wood, and spacing of drying cracks, NSF Workshop on Mechanics of Wood and Related Materials, Syracuse Univ. Minnowbrook Conf. Center, Blue Mountain Lake, N.Y., July 17-19, 1978.
51. Plastic-fracturing models for concrete (with Sang-Sik Kim), ASCE Convention, October 17, 1978, Chicago.
52. Transient analysis of prestressed concrete vessels (with T. B. Belytschko and A. Marchertas), ASCE Convention, Chicago, Oct. 20, 1978.
53. New model for practical prediction of creep and shrinkage, ACI Convention, Houston, Nov. 2, 1978.
54. Constitutive relations for concrete: endochronic and plastic, ACI Convention, Houston, Nov. 2, 1978.
55. Spacing and width of cooling cracks in rock, 4th Workshop on Geothermal Reservoir Engng., Stanford Univ., Dec. 15, 1978.
56. Stochastic theory for creep of concrete (with E. Çinlar), ASCE Specialty Conf. on Probabilistic Mechanics and Structural Reliability, Tucson, Arizona, Jan 11, 1979.
57. Nonlinear behavior of net-reinforced cracked concrete (with P. Gambarova), ASCE Convention, Boston, April 4, 1979.
58. Mathematical model for cracking due to corrosion of steel in concrete, Engng. Foundation Conf. on Cement Production and Use, Franklin Pierce College, Rindge, N.H., June 28, 1979.

59. Ductility and failure of net-reinforced concrete shell walls (with P. Gambarova) 5th Int. Conf. on Structural Mechanics in Reactor Tech., West Berlin, Aug. 16, 1979.
60. Plastic fracturing theory for concrete, 19th Polish Solid Mechanics Conf., Kozubnik, Poland, Sept. 4, 1979.
61. Fracture in concrete, 3rd ASCE-EMD Specialty Conf., U. of Texas, Austin, Sept. 18, 1979.
62. Constitutive behavior of concrete: hysteretic fracturing endochronic theory, Session on Constitutive Relations for Soils and Concrete, ASCE Convention, Atlanta, Oct. 25, 1979.
63. New model for prediction of concrete creep, ACI-CEB Workshop on Creep of Concrete, ACI Convention, Wash., D.C, Oct. 29, 1979.
64. Spurious reflection of elastic waves due to differences in finite element size, Conf. on Choice of Basis Functions in Finite Element Analysis, Wash. Univ., St. Louis, Nov. 13, 1979.
65. Three-dimensional fracture analysis, ASCE Convention, Portland, Ore., April 17, 1980.
66. Propagation of crack bands in concrete, Am. Ceramic Soc. Annual Meeting, Chicago, April 28, 1980.
67. Fracture mechanics of crack bands in concrete, ASTM Symp. on Fracture Mechanics for Ceramics, Rocks and Concrete, Chicago, June 23, 1980.
68. Stability of plastic-fracturing materials, 15th Int. Congr. of Theoretical and Applied Mech. (IUTAM), Toronto, Aug. 19, 1980.
69. Large high-temperature triaxial-torsional testing machine for concrete and rock, NSF Workshop on Large Scale Laboratory Testing in Geomaterials, Berkeley, Calif., Feb. 18, 1981.
70. Moisture transport in concrete at high temperature, Am. Ceramic Soc. Convention, Wash., D.C., May 5, 1981.
71. Random shrinkage stresses in concrete structures, ASCE-ASME Applied Mechanics Conf., Boulder, Colo., June 23, 1981.
72. Finite element program for creep analysis of concrete structures (co-authored with E. Rossow and G. Horrigmoe), 6th Int. Conf. on Struct. Mech. in Reactor Tech. (SMiRT), Paris, Aug. 18, 1981.
73. Tension stiffening effect in rough crack model for reinforced concrete (co-author P. Gambarova), SMiRT6, Aug. 17, 1981.
74. Design of top closures of concrete reactor vessels with very high energy absorption capability (co-authors A. H. Marchertas, R. W. Seidensticker) SMiRT6, Aug. 18, 1981.
75. Design of a prestressed concrete pressure vessel with refractory concrete for use in primary and secondary containment in LMFBR plants (co-authors A. H. Marchertas, R. W. Seidensticker) SMiRT6, Aug. 18, 1981.
76. Strain-rate effect in nonlinear multiaxial deformation of concrete, Z. P. Bažant and B.-H. Oh, ASCE Convention, St. Louis, Mo., Oct. 27, 1981.
77. Crack spacing and slip in reinforced concrete, NSF Cooperative Research Meeting, org. by P. Gergely (Cornell Univ.), held at Ramada Inn, Haperville, Ga., Jan. 18, 1982.
78. Cyclic creep of concrete under various moisture conditions, Z. P. Bažant and L. Panula, Session No. 54-S4.2 at ASCE Nat. Spring Convention, Ceasar's Palace, Las Vegas, Nevada, Apr. 29, 1982.
79. Nonlinear fracture theory of concrete based on softening stress-strain relationship (with B.-H. Oh), 84th Annual Meeting, Am. Ceramic Society, May 5, 1982, Cincinnati, Ohio (Paper 27-T82).
80. Fracture of heterogeneous materials via stress-strain relations (Z.P. Bažant, B.-H. Oh), 9th U.S. Nat. Congress of Appl. Mech., Cornell Univ., Ithaca, N.Y., June 21, 1982.
81. Seismic analysis of an earth dam based on endochronic theory (with A. M. Ansal and R. J. Krizek), Int. Symp. on Num. Methods in Geomechanics, Zürich, ETH, Sept. 16, 1982.
82. Concrete fracture via stress-strain relations (B.-H. Oh), Session No. 13 at ASCE Annual Convention, Hyatt Regency, New Orleans, Oct. 25, 1982.
83. Probabilistic problems in prediction of creep and shrinkage effects in structures, ASCE Annual Convention, Hyatt Regency, New Orleans, Oct. 29, 1982.
84. Mathematical models of nonlinear behavior and fracture of reinforced concrete, Session PVP-3 at ASME 103rd Winter Annual Meeting, Phoenix, AR, Nov. 18, 1982.
85. Spacing of Cracks in Reinforced Concrete (B.-H. Oh), 85th Annual Meeting, Am. Ceramic Soc., Conrad Hilton, Chicago, Apr. 26, 1983.
86. Probabilistic prediction of concrete creep and shrinkage (with J.-C. Chern), 80th Annual Meeting, Am. Ceramic Soc., Conrad Hilton, Chicago, Apr. 26, 1983.
87. Modeling of fracture, Workshop on Mathematical Modeling of Fracture and Nonlinear Behavior of Concrete (chairman F. H. Wittmann), Swiss Fed. Inst. of Technology, Lausanne, July 14, 1983.
88. Constitutive equations, Workshop on Mathematical Modeling of Fracture and Nonlinear Behavior of Concrete (chairman F. H. Wittmann), Swiss Fed. Inst. of Technology, Lausanne, July 14, 1983.
89. Blunt crack band propagation in finite element analysis for concrete structures (with P. Pfeiffer and A. Marchertas), 7th Intern. Conf. on Struct. Mech. in Reactor Technology, Marriott Hotel, Chicago, Aug. 25, 1983.
90. Constitutive models of concrete for finite element analysis, SMiRT7 Postconference Seminar "CONFABRE 4" on Issues in Containment Analysis & Design, Aug. 29, 1983.
91. Microplane model for fracture of heterogeneous materials, ASCE Annual Convention, Hous-

ton, Oct. 19, 1983.

92. Application of fracture mechanics to reinforced concrete, 4th ASCE-EMD Specialty Conf. on Recent Advances in Engineering Mechanics, Purdue Univ., May 23, 1983.

93. Microplane model for progressive fracturing, 4th ASCE-EMD Specialty Conf. on Recent Advances in Engineering Mechanics, Purdue Univ., May 23, 1983 (with B.-H. Oh).

94. Microplane model for fracture of heterogeneous materials (with B.-H. Oh), ASCE Annual Convention, Hyatt Regency, Houston, Oct. 18, 1984.

95. Model of weak planes for concrete subject to tension and shear (with P. Gambarova, presenter), RILEM Int. Conf. on Concrete Materials under Multiaxial Conditions, Toulouse, France, May 24, 1984.

96. Probabilistic analysis of the effect of creep and random environment in concrete structures, ASCE Specialty Conference on Probabilistic Mechanics and Structural Reliability, Univ. of Calif., Berkeley, Jan. 11, 1984.

97. Strain-softening, DNA Concrete Material Properties Meeting, Terra Tek, Salt Lake City, March 7, 1984.

98. Microplane model for strain-controlled inelastic behavior, ASCE Spring Convention, Atlanta Hilton, May 14, 1984.

99. Is strain softening mathematically admissible? (with T.-P. Chang), 5th ASCE-EMD Specialty Conf., Laramie, Wyo., Aug. 2, 1984.

100. Effect of progressive fracturing on the creep of concrete (with J.-C. Chern), 5th ASCE-EMD Specialty Conf., Laramie, Wyo., Aug. 2, 1984.

101. Shear fracture tests of concrete, ACI Fall Convention, New York, Nov. 1, 1984.

102. Nonlocal continuum approach to strain-softening, U.S.- Netherlands Workshop on Structural Mechanics (P. Gergely, chairman), New York, Nov. 2, 1984.

103. Strain-softening materials and finite element solutions (presented by T. Belytschko, co-author), ASME Winter Annual Meeting, New Orleans, Dec. 14, 1984.

104. Fracture theory for nonhomogeneous brittle materials with application to sea ice, Arctic 85 - ASCE Nat. Conf. on Civil Engng. in the Arctic Offshore, San Francisco (Sheraton Palace), Mar. 27, 1985.

105. Tests of shear fracture and strain-softening in concrete (with P. Pfeiffer), 2nd Symp. on the Interaction of Nonnuclear Munition with Structures, Miracle Mile Resort, Panama City Beach, FL, Apr. 16, 1985.

106. Probabilistic analysis of creep effects in concrete structures, 4th Intern. Conf. on Struct. Safety and Reliability (ICOSSAR85), Kobe, Japan, May 27, 1985.

107. Importance of fracture mechanics for concrete dam safety, EPRI-FEMA Workshop on Dam Safety Research, Denver (Golden), Co, July 17, 1985.

108. Consequences of strain-softening for finite element analysis of concrete structures, ASCE Structures Congress, Sept. 17, 1985, Hyatt Regency, Chicago.

109. Creep of concrete during drying (with J.-C. Chern), ACI Convention, Palmer House, Chicago, Oct. 1, 1985.

110. Freezing of concrete: mathematical model for moisture and heat transport (with A. Rosenberg and J.-C. Chern), American Ceramic Soc., 88th Annual Meeting, Hyatt Regency, Chicago, Apr. 28, 1986.

111. Size effects in failure due to distributed cracking (with F.-B. Lin and S. Sener), 10th U.S. Congress of Applied Mechanics, Univ. of Texas, Austin, June 19, 1986.

112. Mechanosorptive effect in hygrophylic adsorbent materials with micropores and macropores, NSF Workshop on Paper Physics (by Univ. of Syracuse), Blue Mountain Lake, N.Y., Aug. 14, 1986.

113. Effect of cracking on moisture diffusion through concrete (with S. Sener and J.-K. Kim), 4th RILEM International Symp. on Creep and Shrinkage of Concrete: Mathematical Modeling, Northwestern University, Aug. 29, 1986.

114. Nonlinear aging viscoelastic model for concrete creep, 4th RILEM International Symposium on Creep and Shrinkage of Concrete: Mathematical Modeling, Northw. Univ., Aug. 29, 1986.

115. Size effect and its use for determination of fracture parameters (by Z. P. Bazant, P. A. Pfeiffer and P. C. Prat), ASCE Structures Congress, Hyatt Regency, New Orleans, Sept. 17, 1987.

116. Effects of uncertainty in creep and shrinkage properties on the response of bridge and other structures, *ibid.*, Sept. 18, 1987.

117. Uncertainty and errors in the prediction of long-time deflections and stresses in prestressed concrete bridges, Transportation Research Board - 66th Annual Meeting, Sheraton Hotel, Washington, D.C., Jan. 12, 1987.

118. Fracture energy of concrete (presented by co-author P. Pfeiffer), J. and B. Mather Intern. Conf. on Concrete Durability, Atlanta, Apr. 28, 1987.

119. Continuum damage: microplane model (co-author P. Prat), ASCE Engng. Mech. Division 6th Specialty Conference, State Univ. of New York, Buffalo, May 21 1987.

120. Nonlocal damage theory (co-author G. Pijaudier-Cabot), *ibid.*, May 22, 1987.

121. Fracture tests of concrete using different specimen geometries (co-authors P. A. Pfeiffer and G. Pijaudier-Cabot), 9th Int. Conf. on Struct. Mech. in Reactor Technology (SMiRT), Lausanne, Aug. 17, 1987.

122. Strain localization and size effect in heterogeneous brittle materials with distributed damage and softening (presented by co-author G. Pijaudier-Cabot), RILEM Congress, Paris, Versailles, Sept. 10, 1987.
123. Stability and convergence of nonlocal damage theory for strain-softening (with G. Pijaudier-Cabot), 24th Annual Meeting of the Society of Engineering Science, University of Utah, Salt Lake City, Sept. 22, 1987.
124. Fracture mechanics size effects and ultimate load formulas for brittle failures of concrete structures, ACI Fall Convention, Seattle, Nov. 12, 1987.
125. Transient solutions for one-dimensional problems with strain-softening (with T. Belytschko, X.-J. Wang and Y. Hyun), 108th ASME Winter Annual Meeting, Boston, Dec. 14, 1987 (presented by T. B. Belytschko).
126. Creep uncertainty and long-time serviceability of concrete bridges and other structures (with J.-K. Kim), American Concrete Institute Annual Convention, Orlando, FL, March 24, 1988.
127. Sampling analysis of statistical variability of deflections due to creep and shrinkage (with J.-K. Kim), *ibid.*, March 25, 1988.
128. Bifurcation and stability of structures with plasticity and softening damage (with L. Cedolin and F.-B. Lin), ASCE Engineering Mechanics Division Specialty Conference, VPI, Blacksburg, VA, May 23, 1988.
129. Prediction of concrete creep and shrinkage by sampling on the basis of correlated random material parameters (with Y.-P. Xi), ASCE-EMD/GRD/STD Joint Specialty Conference on Probabilistic Methods, VPI, Blacksburg, VA, May 26, 1988.
130. Statistics of shrinkage test data (with F. H. Wittmann, F. Alou and J.-K. Kim), *ibid.*, May 26, 1988.
131. Localization of softening in ellipsoids and bands: parameter study (with F.-B. Lin), Applied Mechanics and Engineering Sciences Conference (Joint ASME/SES Meeting), Univ. of Calif., Berkeley, CA, June 21, 1988.
132. Nonlocal character of continuum damage: theory, experiment and application (with G. Pijaudier-Cabot), *ibid.*, June 21, 1988.
133. Thermodynamic analysis of stable paths of structures with damage, fracture or plasticity (with M. Tabbara and M. T. Kazemi), 17th Intern. Congress of Theoretical and Applied Mechanics, Grenoble, France, Aug. 23, 1988.
134. Micromechanics of distributed cracking in relation to concrete fracture (presented in French), Prepared Discussion, European Conference on Cracking of Concrete and Durability of Construction, AFREM, Saint-Rémy-lès-Chevreuses, Paris, France, Aug. 31, 1988.
135. Local and nonlocal models for strain-softening and their comparison based on dynamic analysis, France-U.S. Workshop on Strain Localization and Size Effect Due to Cracking and Damage, sponsored by NSF and CNRS, held at Ecole Normale Supérieure, Paris Cachan, France, presented by co-author G. Pijaudier-Cabot, September 8, 1988.
136. Stable states and stable paths of propagation of damage zones: Nonlocal analysis of shear bands, *ibid.*, presented by co-author P. Droz, September 8, 1988.
137. Nonlocal continuum damage, localization, instability and convergence, co-authored with G. Pijaudier-Cabot, 109th ASME Winter Annual Meeting, Hyatt Regency, Chicago, November 28, 1988.
138. Softening instability: I. Localization into a planar band, and II. Localization into ellipsoidal regions, *ibid.*, November 29, 1988.
139. Stable paths and states of irreversible structural systems: Thermodynamic analysis and implications for composites, co-authored with L. Cedolin and R. Gettu, *ibid.*, November 30, 1988.
140. Recent advances in stability of structures with plasticity, damage or fracture, co-authored with L. Cedolin, R. Gettu, M. Kazemi and F.B. Lin, First Pan-American Congress of Applied Mechanics (PACAM), Catholic University (PUC), Rio de Janeiro, Brazil, January 5, 1989.
141. Solidification theory for concrete creep and its application to structures, co-authored with S. Prasannan, ACI Annual Convention, Atlanta, February 22, 1989.
142. Stress-strain relation for aging creep of cement and concrete based on solidification theory, co-authored with S. Prasannan, 91st Annual Meeting, American Ceramics Society, Indianapolis, April 24, 1989.
143. Microplane model for triaxial deformation of soils, presented by co-author P.C. Prat, Third International Symposium on Numerical Models in Geomechanics (NUMOG III), Niagara Falls, Canada, May 10, 1989.
144. Long-term modeling and prediction, presentation on ACBM Thrust Group Program at ACBM Industrial Affiliates Meeting, Northwestern University, June 7, 1989.
145. Creep of concrete in strain-softening range and its effect on fracture, co-authored with R. Gettu, Third Joint ASCE/ASME Mechanics Conference, University of California, San Diego, in La Jolla, July 10, 1989.
146. Micro and macromodeling of material damage due to cracking, *ibid.*, July 12, 1989.
147. Fracture Mechanics of Concrete: Recent Developments (Introductory Lecture of a Short Course), Swiss Federal Institute of Technology, Lausanne, Sept. 25, 1989.
148. Probabilistic prediction of creep and shrinkage in concrete structures: Combined sampling and spectral approach, co-authored with Y. Xi, Fifth

International Conference on Structural Safety and Reliability (ICOSSAR), Parc Fifty-Five Hotel, San Francisco, August 9, 1989.

149. Rate processes in the fracture of cement composites (co-author: K. T. Faber), Semi-Annual Meeting, NSF Center for Advanced Cement-Based Materials, Northwestern University, Evanston, October 18, 1989.

150. Modeling, long-term performance and prediction (co-author: H. Jennings), *ibid.*, Oct. 18, 1989

151. Cracking damage and creep in a drying box girder bridge segment (co-author: V. Krístek), ACI Fall Convention, San Diego, CA, November 2, 1989.

152. Influence of loading rate and temperature on fracture of concrete, *ibid.*, November 3, 1989.

153. Size dependence of concrete fracture and energy determined by RILEM work of fracture method (co-author: M. T. Kazemi), ACI Spring Convention, Royal York Hotel, Toronto, March 21, 1990.

154. Interacting crack systems in particulate or fiber reinforced composites, presented by co-author G. Pijaudier-Cabot (also co-authored by Y. Berthaud), 5th Int. Conf. on Numerical Methods in Fracture Mechanics, Freiburg, Germany, April 23-17, 1990.

155. Stable path of crack systems in homogeneous and aggregate materials (co-authors: G. Pijaudier-Cabot, Y. Berthaud, and M. Tabbara), 11th US National Congress of Applied Mechanics, University of Arizona, Tucson, May 21, 1990.

156. Practical prediction of concrete shrinkage and its uncertainty (co-author: Joong-Koo Kim), 1st ASCE Materials Engineering Congress, Denver (Marriott), August 13, 1990.

157. Microplane constitutive model for soils, presented by co-author P. C. Prat, *ibid.*, August 14, 1990.

158. Brittleness of high strength concrete, presented by co-author R. Gettu (also co-authored by M. E. Karr), *ibid.*, August 14, 1990.

159. Size effect in concrete structures and influence of loading rate (co-author: R. Gettu), *ibid.* August 14, 1990.

160. Localization instabilities due to damage and fracture propagation: application to tensile specimens (co-author: M. R. Tabbara), *ibid.*, August 14, 1990.

161. Bifurcation and stable response of bodies with interactive fracture or damage zones (co-author: M. R. Tabbara), 2nd World Congress on Computational Mechanics, University of Stuttgart, August 28, 1990.

162. Nonlocal statistical size effect in structures with large stable crack growth (co-authored with Y. Xi), 27th Annual Meeting, Society of Engineering Science, Santa Fe, NM, Oct. 23, 1990.

163. Should concrete design codes consider fracture mechanics size effect? ACI Convention, Philadelphia, Nov. 12, 1990.

164. Random particle simulation of damage and fracture in particulate or fiber-reinforced composites (co-authored with M.R. Tabbara, M.T. Kazemi and G. Pijaudier-Cabot), 111th ASME Winter Annual Meeting, Dallas, TX, Nov. 26, 1990.

165. Modeling of cracking induced damage in particulate and fiber composites (co-authored with G. Pijaudier-Cabot and Y. Berthaud), 111th ASME Winter Annual Meeting, Dallas, TX, Nov. 27, 1990.

166. Equilibrium path bifurcation due to strain-softening localization in ellipsoidal region, 111th ASME Winter Annual Meeting, Dallas, TX, Nov. 27, 1990.

167. Damage-rheology uncoupling for microplane damage tensor (presented by co-author, I. Carol), 3rd Int. Conference on Constitutive Laws for Engineering Materials: Theory and Applications (org. by C.S. Desai and E. Krempl), Tucson, AZ, Jan. 7, 1991.

168. Damping properties of concrete beam (presented by first author, R. Kohoutek), ASTM International Symposium on M^3D : Mechanics and Mechanisms of Material Damping, Baltimore, MD, March 14, 1991.

169. Is no-tension design of dams safe according to fracture mechanics? (co-author, G. Gioia), ACI Spring Convention Boston, March 21, 1991.

170. Fracture mechanics size effect in concrete structures, 9th Structures Congress ASCE, Indianapolis, IN, April 29, 1991.

171. Transport properties, Joint External and Internal Advisory Board Meeting, NSF Center for Science and Technology of Advanced Cement-Based Materials, Northwestern University, May 9, 1991.

172. Moisture diffusion in concrete and mechanisms of drying creep (co-authored with Y. Xi and L. Molina), ASCE Engineering Mechanics Specialty Conference on Mechanics Computing in 1990's and Beyond, Columbus, OH, May 20, 1991.

173. A time-dependent microplane model for creep of cohesive soils, presented by first author, P.C. Prat, ASCE Engineering Mechanics Specialty Conference on Mechanics Computing in 1990's and Beyond, Columbus, OH, May 20, 1991.

174. Nonlocality of continuum approximation of microcracked materials, *ibid.*, Columbus, OH, May 21, 1991.

175. Numerical analysis of fracture and damage localization (co-authored by G. Gioia and S. Beissel), 1st U.S. National Congress on Computational Mechanics, Hyatt Regency, Chicago, July 22, 1991.

176. Nonlocal generalization of Weibull theory for random strength of concrete structures (co-authored by Y. Xi), 11th Int. Conference on Structural Mechanics in Reactor Technology (SMiRT I), Tokyo, Aug. 20, 1991.

178. Fracture energy and effective process zone, presentation at Northeast Regional Review Agenda, Office of Naval Research, Arlington, VA., October

- 22, 1991 (with D. Sodhi).
179. Symmetry breaking bifurcations in strain softening damage: Tensile buckling and shear bending (co-authors: L. Cedolin and J. Ozbolt), 28th Annual Meeting, Society of Engineering Science, University of Florida, Gainesville, November 6, 1991.
180. Critical evaluation of recent researches on penetration of arctic ice plates by submarines, ONR Ice Penetration Workshop, Analysis and Technology, Inc., Washington, D.C., December 16, 1991.
181. Rate processes in fracture of cement, Technical Review Meeting, Center for Advanced Cement-Based Materials, Northwestern University, April 22, 1992.
182. Direct tensile test: Stability and bifurcation (co-author L. Cedolin), 9th Engineering Mechanics Conferences of ASCE, Texas A & M University, College Station, Texas, May 25, 1992.
183. Nonlinear analysis of strain-softening damage under monotonic and cyclic load (co-authors J. Ozbolt and R. Eligehausen), *ibid*, May 26, 1992.
184. Markov model for random growth of crack with R-curve (co-author Y. Xi), First Int. Conference on Fracture Mechanics of Concrete Structures (FraMCoS 1), Breckenridge, Colorado, June 1, 1992.
185. Microplane-type constitutive models for distributed damage and localized cracking in concrete structures (presented by co-author I. Carol), *ibid*, June 3, 1992.
186. Why direct tension specimens flex and break at midlength, *ibid*, June 3, 1992.
187. Size effect in strength of reinforced concrete columns (co-author Y.-W. Kwon), *ibid*, June 4, 1992.
188. R-curve modeling of rate effect in static fracture and its interference with size effect (co-author M. Jirásek), *ibid*, June 4, 1992.
189. Dynamic fracture of concrete (presented by co-author J. Isenberg), *ibid*, June 5, 1992.
190. Large scale fracture mechanics of sea ice plates, 11th IAHR Int. Ice Symposium, Banff, Alberta, June 16, 1992.
191. Large scale fracture of sea ice plates, Joint Civil Engineering and Mechanics Engineering Seminar Lecture, University of Calgary, Alberta, June 18, 1992.
192. Instabilities and bifurcations due to strain-softening damage and fracture (co-authors L. Cedolin and J. Ozbolt), 18th Int. Congress of Theoretical and Applied Mechanics, Haifa, Israel, August 25, 1992.
193. Size effect in large-scale bending fracture of floating sea ice plate, Society of Engineering Science 29th Annual Technical Meeting, University of California, San Diego (La Jolla), September 14, 1992.
194. Fracture of sea ice in the Arctic Ocean: Proposal for large scale in-situ tests, ONR Ice Mechanics Workshop, Dunsmuir Lodge, Sidney, Vancouver Island, B.C., Canada, October 12, 1992.
195. Size effect due to fracture behavior and its impact on design code, ACI Fall Convention, San Juan, Puerto Rico, October 29, 1992.
196. Discrete element modeling of fracture and size effect in quasibrittle materials (with M. Jirásek), Second Int. Conference on Discrete Element Methods (DEM), MIT, Cambridge, MA, March 18, 1993.
197. Fracture of random quasibrittle materials: Markov process and Weibull-type models (with Y. Xi), 6th International Conference on Structural Safety and Reliability (ICOSSAR), Innsbruck, Austria, August 11, 1993.
198. Effects of crack growth rate and creep in static fracture of concrete (with M. Jirásek), Invited Lecture, Division H, 12th International Conference on Structural Mechanics in Reactor Technology (SMiRT), Stuttgart University, Germany, August 17, 1993.
199. Finite element modeling of rate effect in concrete fracture with influence of creep (co-author Z. Wu), ConCreep 5 (5th RILEM International Symposium on Creep and Shrinkage of Concrete), Barcelona, Sept. 6, 1993.
200. New test method to separate microcracking from drying creep (co-author Y. Xi), ConCreep 5 (5th RILEM International Symposium on Creep and Shrinkage of Concrete), Barcelona, Sept. 7, 1993.
201. Continuous retardation spectrum for solidification theory (co-author Y. Xi), ConCreep 5 (5th RILEM International Symposium on Creep and Shrinkage of Concrete), Barcelona, Sept. 8, 1993.
202. Improved pore water diffusion model for creep analysis of concrete structures (co-authors Y. Xi and L. Molina), ConCreep 5 (5th RILEM International Symposium on Creep and Shrinkage of Concrete), Barcelona, Sept. 9, 1993.
203. Mechanism of drying creep in cement-based materials: diffusion processes and microcracking, (co-author Y. Xi), American Ceramics Society, PAC-RIM Meeting, Honolulu, Hawaii, November 8, 1993.
204. Nonlocal continuum damage formulation based on micromechanics of crack interactions, 114th Winter Annual Meeting, American Society of Mechanical Engineers, New Orleans, La., December 2, 1993.
205. Generalized microplane model for concrete with application to impact problems (co-author M. Jirásek), EURO-C 1994 (International Conference on Computational Modeling of Concrete Structures), Innsbruck, March 24, 1994.
206. Scaling laws for large-scale bending fracture of sea ice plate, 12th U. S. National Congress of Applied Mechanics, Seattle, Wa., June 30, 1994.
207. Quasibrittle compression fracture: stability aspect and size effect (co-author Y. Xiang), 12th U. S. National Congress of Applied Mechanics, Seattle, Wa., June 30, 1994.
208. Localization of softening damage in frames and implications for earthquake resistance (co-

- author M. T. Kazemi), 5th U. S. National Conference on Earthquake Engineering, Chicago, IL., July 12, 1994.
209. Fracture behavior and process zone, Presentations to Site Visit Team to decide funding renewal for NSF S&T ACBM Center, Northwestern University, September 8, 1994.
210. Stud connectors in composite beams: simplified failure modeling and size effect (with J. L. Vitek), Europe-U.S. Workshop on "Fracture and Damage in Quasibrittle Structures: Experiment, modeling and computer analysis", held at Czech Technical University (ČVUT), Prague, September 22, 1994.
211. New continuum damage model with non locality derived from microcrack interactions, AF-SOR Contractors' Meeting on Mechanics of Materials and Structural Mechanics, University of Illinois, Chicago, September 27, 1994 (presented by G.J. Dvorak).
212. Time dependent cohesive fracture (with Y.-N. Li), 31st Annual Technical Meeting, Society of Engineering Science, Texas A&M University, College Station, Texas, October 10, 1994.
213. Interaction of fracture and creep in concrete (with Y.-N. Li), ACI Fall Convention, Tarpon Springs, Florida, October 26, 1994.
214. Compression failure of quasibrittle materials and size effect (with Y. Xiang), ASME Winter Annual Meeting, Chicago (Symposium on Damage Mechanics Composites), November 10, 1994.
215. Microplane model for concrete, Meeting of "Penetration Technology Coordination Group", U.S. Army Corps of Engineers Waterways Experiment Station (WES) Vicksburg, Mississippi, December 6, 1994.
216. Modeling of fracture and damage in concrete, ACI Spring Convention, Salt Lake City, March 6, 1995.
217. Quasibrittle fracture: problems and research directions, AFSOR Meeting on Research Needs in Materials, Northwestern University, Department of Materials Science, April 6, 1995.
218. Effect of size on distributed damage and fracture of sea ice (with Y.N. Li, M. Jirásek, Z. Li and J.J. Kim), Sea Ice Mechanics and Artic Modeling Workshop, Anchorage, Alaska, April 24, 1995.
219. Size effect determination of macro fracture characteristics of random heterogeneous materials (with M. Jirásek), 10th ASCE Engineering Mechanics Specialty Conference, University of Colorado, Boulder, May 22, 1995.
220. Nonlocal microplane model for damage due to cracking (with Y. Xiang and J. Ozbolt), 10th ASCE Engineering Mechanics Specialty Conference, University of Colorado, Boulder, May 22, 1995.
221. Continuous retardation spectrum for solidification theory of aging creep of concrete (with S. Baweja and Y. Xi), 10th ASCE Engineering Mechanics Specialty Conference, University of Colorado, Boulder, May 22, 1995.
222. Tangential moduli of elastic material with growing cracks (with P.C. Prat), Joint Applied Mechanics and Materials Summer Conference, ASME, University of California, Los Angeles, June 30, 1995.
223. Part-through bending cracks in sea ice plates: mathematical modeling (with J.J. Kim and Y.N. Li), Joint Applied Mechanics and Materials Summer Conference, ASME, University of California, Los Angeles, June 30, 1995.
224. Additive volumetric-deviatoric split of finite strain tensor and its implication for cracking models, Second International Conference on Fracture Mechanics of Concrete and Concrete Structures, FraMCos-2 ETH (Swiss Federal Institute of Technology), Zürich, July 25, 1995.
225. Seismic localization of softening cracking damage in concrete frames (with Jirásek), Second International Conference on Fracture Mechanics of Concrete and Concrete Structures, ETH (Swiss Federal Institute of Technology), Zürich, July 25, 1995.
226. Particle model for fracture and statistical micro-macro correlation of material constants (with Jirásek, presenter), Second International Conference on Fracture Mechanics of Concrete and Concrete Structures, ETH (Swiss Federal Institute of Technology), Zürich, July 26, 1995.
227. New developments in microplane/multicrack models for concrete (by I. Carol, Presenter, and Z.P. Bažant), Second International Conference on Fracture Mechanics of Concrete and Concrete Structures, ETH (Swiss Federal Institute of Technology), Zürich, July 27, 1995.
228. Basic problems in size effects. Workshop on Size Effects, as part of 2nd Int. Conf. on Fracture Mechanics of Concrete and Concrete Structures (FraMCos-2), ETH (Swiss Federal Institute of Technology), Zürich, July 26, 1995.
229. Loading rate dependence of toughening mechanism in cementitious material (presented by S. Tandon, co-authors K.T. Faber and Z.P. Bažant), Gordon Conference on Physics and Chemistry of Cementitious Materials, Plymouth State University, New Hampshire, August, 1996.
230. Finite strain analysis of deformation of quasibrittle material during missile impact and penetration (co-authors M. Adley and Y. Xiang), Int. Mechanical Engineering Congress, ASME, Atlanta (Hilton), November 21, 1996.
231. Analysis of pore pressure, thermal stress and fracture in rapidly heated concrete. NIST Workshop on Fire Performance of High Strength Concrete, National Institute of Standards and Technology (NIST), Gaithersburg, MD, February 13, 1997.
232. Compression failure of concrete and size effect. Semi-annual meeting, Center for Advanced Cement Based Materials, Northwestern University,

March 27, 1997.

233. Scaling of compression fracture, Joint ASCE-ASME-SES Mechanics Conference (McNU), Northwestern University, June 30, 1997.

234. Tangential stiffness of elastic material with growing or closing cracks (with P.C. Prat), Joint ASCE-ASME-SES Mechanics Conference (McNU), Northwestern University, June 30, 1997.

235. Microprestress solidification theory for drying and aging creep of concrete (with B. Hauggaard, S. Baweja, and F.-J. Ulm), Joint ASCE-ASME-SES Mechanics Conference (McNU), Northwestern University, July 1, 1997.

236. Effect of loading rate on toughening mechanisms in quasibrittle materials (presented by S. Tandon, with K.T. Faber), Joint ASCE-ASME-SES Mechanics Conf. (McNU), Northwestern University, July 2, 1997.

237. Fracturing truss model for shear failure of R.C. beams. Joint ASCE-ASME-SES Mechanics Conference (McNU), Northwestern University, July 2, 1997.

238. Recent researches in failure mechanics at Northwestern University, Post-Conf. Seminar of 2nd EURO Conf. on Material Instabilities in Deformation and Fracture, held at Porto Carras, Chalkidiki, Greece, Sept. 6, 1997.

239. Similitude of failure and size effect in fiber composites and other quasibrittle materials, ASME International Mechanical Engineering Congress, Windham Anatole Hotel, Dallas, Texas, Nov. 16, 1997.

240. Large-strain material model for impact and penetration of concrete (co-authors M.D. Adley, J.-J. Kim and I. Carol), *ibid.*, Nov. 18, 1997.

241. Statistical and fractal aspects of size effect in quasibrittle structures: conspectus of recent results (co-author Drahomír Novák), 7th International Conf. on Structural Safety and Reliability (ICOSAR '97), Kyoto, Japan, Nov. 26, 1997.

242. Fracture and size effect in composite beams with deformable connectors (co-author J.L. Vitek), Conf. on Computational Modeling of Concrete Structures (EURO-C), held in Badgastein, Austria, April 1, 1998.

243. Micromechanical fracture analysis of ASR-induced damage in concrete with waste glass (co-authors Weihua Jin and Christian Meyer), ASCE 12th Engng. Mechanics Conf., May 18, 1998.

244. Propagation of concentration jump interfaces as a rate-controlling mechanism of diffusion in concrete (co-authors F.-J. Ulm and F. Beltoise), (*ibid.*), May 20, 1998.

245. Concrete with chemically reactive waste glass: effect of particle size (co-authors Weihua Jin and Christian Meyer), 13th U.S. Nat. Congress of Applied Mechanics, U. of Florida, Gainesville, FL, June 22, 1998.

246. Size effect in penetration fracture of sea

ice plate: review of theory and experimental evidence, 14th IAHR Ice Symposium, Clarkson University, Potsdam, New York, July 30, 1998.

247. Scaling of tensile and compressive brittle failures of fiber composites (co-author Emilie Becq-Giraudon), 35th Annual Technical Meeting of Society of Engng. Science, Washington State University, Pullman, Sept. 29, 1998.

248. Bažant, Z.P., Jinn, W., and Meyer, C. (1998). "Microfracturing caused by alkali-silica reaction of waste glass in concrete (co-authors W. Jinn and C. Meyer) 3rd Intern. Conf. on Fracture Mechanics of Concrete Structures (co-author P.C. Prat) (FraMCoS-3), held in Gifu, Japan, Oct. 14, 1998.

249. Stress-strain relation for elastic material with many growing microcracks. *ibid.*, Oct. 15, 1998.

250. Size effects in shear fracture of reinforced concrete beams (co-author Emilie Becq-Giraudon), *ibid.*, Oct. 15, 1998.

251. Size effect in composite beams with deformable connections (presented by second author J.L. Vitek), *ibid.*, Oct. 15, 1998.

252. Structural Catastrophes: What have we learned? ASCE Illinois Section Structural Group Meeting (after dinner lecture), Como Inn, Chicago, Jan. 20, 1999.

253. Modeling of kinetics and fracturing damage of alkali-silica reaction in concrete (co-authors A. Steffens, G. Zi and F.-J. Ulm), 14th ASCE Engr. Mechanics Conference, Johns Hopkins University, Baltimore, MD, June 14, 1999.

254. Nonlocal Weibull theory for statistical characteristics of energetic size effect in quasibrittle fracture (co-author D. Novák), *ibid.*, June 14, 1999.

255. Microplane model for large strain failure analysis of concrete and its application to impact and blast (co-authors F.C. Caner, M.D. Adley and S.A. Akers), 5th U.S. National Congress of Computational Mechanics, University of Colorado at Boulder, Aug. 4, 1999.

256. Simulation of size effect in compression kink band failure of fiber composites by cohesive crack model and nonlocal LEFM (co-authors G.S. Zi, M. Brocca and E. Becq-Giraudon), *ibid.*, Aug. 4, 1999.

257. Effect of particle size on alkali-silica reaction in concrete: chemo-fracture analysis (co-authors G. Zi, A. Steffens and F.J. Ulm), *ibid.*, Aug. 5, 1999.

258. Evaluation of tube-squash test of concrete at very large strains using microplane finite element analysis (presented by co-author M. Brocca), *ibid.*, Aug. 6, 1999.

259. Thermodynamic formulation of microplane models (Milan Jirásek, presenter, I. Carol and Z.P. Bažant). ALERT Meeting, Aussois, France, Oct. 26, 1999.

260. Nonlocal statistical theory for quasibrittle fracture initiation and size effect, 36th Technical Annual Meeting, Society of Engineering Science, University of Texas, Austin, Oct. 27, 1999.

261. Asymptotic scaling of quasibrittle fracture with application to fiber composites and sandwich plates. Office of Naval Research 6.1/6.2 Workshop, Naval Surface Warfare Center, Carderock, MD, May 1, 2000.
262. Probabilistic nonlocal theory for quasibrittle fracture initiation and size effect based on extreme value statistics (co-author D. Novák), 8th ASCE Joint Specialty Conference on Probabilistic Mechanics and Structural Reliability, University of Notre Dame, South Bend, Indiana, July 24, 2000.
263. Regression and Bayesian Approaches to Shrinkage Prediction (co-author M. Holický). 8th ASCE Joint Specialty Conference on Probabilistic Mechanics and Structural Reliability, University of Notre Dame, South Bend, Indiana, July 24, 2000.
264. Energetic probabilistic theory of fracture scaling (co-author D. Novák), 20th Int. Congress of Theoretical and Applied Mechanics (ICTAM), Int. Union of Theor. & Appl. Mech. (IUTAM), Chicago (Mariott), August 31, 2000.
265. Three-dimensional constitutive model for shape memory alloys based on microplane model (co-authors C. Brinson, presenter, and M. Brocca), *ibid.*, Sept. 1, 2000.
266. Compressive failure, large strain ductility and size effect in concrete: microplane model (co-author M. Brocca), Eur. Congr. on Computational Methods in Applied Sci. and Engrg. (incl. COMPLAS-6), Barcelona, Sept. 13, 2000.
267. Large-strain microplane modeling of dynamic failure of concrete structures with fracturing rate effects (co-authors F.C. Caner, M.D. Adley and S.A. Akers), 37th Annual Techn. Meeting, Society of Engrg. Science, Univ. of South Carolina, Columbia, SC., Oct. 23, 2000.
268. Durability modeling of concrete. NSF Long-Term Durability Workshop, UC Berkeley, Oct. 26, 2000.
269. Failure of foam core sandwich structures: numerical simulation by microplane model (with M. Brocca). ASME Int. Mechanics Engineering Congress, Orlando, Florida, Nov. 9, 2000.
270. Asymptotic scaling of dislocation-based strain-gradient plasticity. Intern. Workshop on Deterioration of Engineering Materials at Various Scales of Observation (honoring Kaspar Willam). Opening lecture. Hirschegg, Kleinwalsertal (Tirol), Austria, March 25, 2001.
271. Size effect in fracture of sandwich plates: recent advances (with I.M. Daniel), ONR Review - Composites for Marine Structures, University of Maryland, College Park, May 7, 2001.
272. Bažant, Z.P., and Becq-Giraudon, E. (2001). "Estimation of fracture energy from basic characteristics of concrete." 4th Int. Conf. on Fracture Mechanics of Concrete Structures (FraMCoS-4), ENS de Cachan, France, May 29, 2001.
273. Bažant, Z.P., Červenka, J., and Wierer, M. (2001). "Equivalent localization element for crack band model and as alternative to elements with embedded discontinuities." 4th Int. Conf. on Fracture Mechanics of Concrete Structures (FraMCoS-4), ENS de Cachan, France, May 29, 2001.
274. Bažant, Z.P. (2001). "Size effects in quasibrittle fracture: Aperçu of recent results." 4th Int. Conf. on Fracture Mechanics of Concrete Structures (FraMCoS-4), ENS de Cachan, France, May 30, 2001.
275. Bažant, Z.P., and Novák, D. (2001). "Non-local Weibull theory and size effect in failures at fracture initiation." *Fracture Mechanics of Concrete Structures. 4th Int. Conf. on Fracture Mechanics of Concrete Structures (FraMCoS-4)*, ENS de Cachan, France, May 30, 2001.
276. Bažant, Z.P., and Caner, F.C. (2001). "Vertex effect and confinement of fracturing concrete via microplane model M4." Fracture Mechanics of Concrete Structures. 4th Int. Conf. on Fracture Mechanics of Concrete Structures (FraMCoS-4), ENS de Cachan, France, May 31, 2001.
277. Carol, I., Jirásek, M., and Bažant, Z.P. (2001). "New thermodynamic framework for microplane model." *Fracture Mechanics of Concrete Structures. 4th Int. Conf. on Fracture Mechanics of Concrete Structures (FraMCoS-4)*, ENS de Cachan, France, May 31, 2001.
278. Bažant, Z.P., and Novák, D. (2001). "Non-local Weibull theory and size effect in failures at fracture initiation." Fracture Mechanics of Concrete Structures. 4th Int. Conf. on Fracture Mechanics of Concrete Structures (FraMCoS-4), ENS de Cachan, France, May 29, 2001.
279. Fracturing rate and creep for concrete dynamics (with F.C. Caner, M.D. Adley and S.A. Akers). 2001 Mechanics and Materials Summer Conference, ASME, ASCE, SES (Sheraton), June 27, 2001.
280. Size effect in dislocation-based gradient plasticity on sub-micron scale (with Z. Guo). 2001 Mechanics and Materials Summer Conference, ASME, ASCE, SES (Sheraton), June 27, 2001.
281. 3D lattice model for dynamic simulations of creep, fracturing and rate effect in concrete, by G. Cusatis (presenter), Z.P. Bažant and L. Cedolin, 6th Intern. Conf. on Creep, Shrinkage and Durability Mechanics of Concrete and Other Quasi-Brittle Materials (CONCREEP-6), MIT, Cambridge, MA, August 20, 2001.
282. Temperature effect on concrete creep modeled by microprestress-solidification theory, by Z.P. Bažant (presenter), L. Cedolin and G. Cusatis, 6th Intern. Conf. on Creep, Shrinkage and Durability Mechanics of Concrete and Other Quasi-Brittle Materials (CONCREEP-6), MIT, Cambridge, MA, August 21, 2001.
283. Continuous relaxation spectrum of concrete creep and its incorporation into microplane model M4, by G. Zi (presenter) and Z.P. Bažant, 6th In-

tern. Conf. on Creep, Shrinkage and Durability Mechanics of Concrete and Other Quasi-Brittle Materials (CONCREEP-6), MIT, Cambridge, MA, August 21, 2001.

284. Size effect in fracture of sandwich structure components: Foam and Laminate (co-authors I.M. Daniel, Y. Zhou and D. Novák), ASME International Mechanical Engrg. Congress, New York (Hilton), Nov. 11, 2002.

285. Scaling problems of nanocomposites. ONR Review "Composites for Marine Structures, org. by RDJ Rajapakse, Office of Naval Research, University of Maryland, May 6, 2002.

286. Scaling of failure of composites (co-authors Y. Zhou, G. Zi, D. Novák, I.M. Daniel), org. by RDJ Rajapakse, Office of Naval Research, University of Maryland, May 6, 2002.

287. Scaling of failure of floating sea ice plates (co-author Z. Guo). 15th ASCE Engrg. Mech. Division Conf., Columbia University, New York, June 3, 2002.

288. Experimental-analytical size effect prediction of modulus of rupture of concrete (presented by co-author D. Novák, 3rd co-author J. Vítek). Inter. Symp. on Nontraditional Cement and Concrete, Brno University of Technology, Brno, Czech Republic, June 13, 2002.

289. Asymptotic scaling of gradient theory of micro-scale plasticity of metals. 14th US National Congress of Theoretical and Applied Mechanics, Virginia Tech, Blacksburg, June 24, 2002.

290. Size effects in sea ice fracture and triggering of avalanches. 14th US National Congress of Theoretical and Applied Mechanics, Virginia Tech, Blacksburg, June 24, 2002.

291. Scaling laws for sea ice fracture and triggering of dry snow slab avalanches. Symp. on Geotechnical Materials: Measurement and Analysis, honoring Prof. R.J. Krizek, Northwestern University, Evanston, Illinois, Aug. 3, 2002.

293. Scale effects in composites and sandwich structures (co-authors F. Caner, Y. Zhou and I.M. Daniel), 17th Annual Technical Conference, American Society for Composites, Purdue University, West Lafayette, Indiana, October 22, 2002.

294. Computational modeling of statistical size effect in quasibrittle structures (co-authors D. Novák, M. Vořechovský), 9th Int. Conf. on Applications of Statistics and Probability in Civil Engineering (ICASP-9), San Francisco (Sir Francis Drake Hotel), July 8, 2003.

295. Consequences of fracture mechanics for size effect in shear failure of beams (with Q. Yu and M.T. Kazemi), ACI Convention, Boston (Sheraton), Sept. 30, 2003.

296. Probabilistic-energetic theory of scale effects in quasibrittle structures. ASME International Mechanical Engineering Congress, Washington, D.C. (Omni Shoreham). Nov. 17, 2003.

297. Damage, fracture and size effect in fiber-

reinforced materials. RILEM Spring Meeting (Symp. on "Advances in Concrete through Science and Engineering"), Northwestern University, Evanston, IL, March 22, 2004.

298. Shear failure, instabilities and fracture of sandwich plates. ONR Review Meeting of Solid Mechanics Program. University of Maryland (The Inn & Conf. Center), Adelphi, MD, March 24, 2004.

299. Fracturing material models based on micromechanical concepts: Recent advances (with F.C. Caner, L. Cedolin, G. Cusatis & G. di Luzio). FraMCoS-5 (5ht Int. Conf. on Fracture Mechanics of Concrete and Concrete Structures), Vail (Cascade Resort), Colorado, Apr. 12, 2004.

300. Size effect in fracture of concrete specimens and structures: New problems and progress (with Q. Yu). FraMCoS-5 (5ht Int. Conf. on Fracture Mechanics of Concrete and Concrete Structures), Vail (Cascade Resort), Colorado, Apr. 12, 2004.

301. Statistical size effect in quasibrittle materials: Computation and extreme value theory (with S.D. Pang, M. Vořechovský, D. Novák & R. Pukl). FraMCoS-5 (5ht Int. Conf. on Fracture Mechanics of Concrete and Concrete Structures), Vail (Cascade Resort), Colorado, Apr. 12, 2004.

302. Stability and geometrically nonlinear effects in structures with microstructure soft in shear (co-author A. Beghini), 41st Annual Meeting of Soc. of Engrg. Science, U. of Nebraska, Lincoln, Oct. 11, 2004.

303. Microplane model for strength, fracture and softening damage in fiber composites (co-author A. Beghini), 41st Annual Meeting of Soc. of Engrg. Science, U. of Nebraska, Lincoln, Oct. 11, 2004.

304. Microplane model for fiber reinforced concrete: Nonlinear triaxial behavior, strength and softening, ACI (Am. Concrete Institute) Fall Convention, San Francisco (Hilton), Oct. 25, 2004.

305. New results on size effect in beam shear, presentation at ACI 445 committee meeting, San Francisco (Hilton), Oct. 25, 2004.

306. Stability of structures soft in shear: Orthotropic, layered and sandwich structures (presented by co-author A. Beghini), ASME Annual Convention, Anaheim (Convention Center), CA, Nov. 18, 2004.

307. Epitaxially influenced boundary layer model for size effect in thin metallic films (co-author Z. Guo), ASME Annual Convention, Anaheim (Convention Center), CA, Nov. 18, 2004.

308. Procedure of statistical size effect prediction for crack initiation problems (presented by co-author M. Vořechovský), 11th Int. Conf. on Fracture (ICF-11), Turin, Italy, March 23, 2005.

309. Fracture scaling of composites, foams and sandwich structures, Grantees' Meeting on "Marine Composites and Sandwich Structures", ONR (Office of Naval Research) Solid Mechanics Program, The Inn and Conference Center, University of Maryland,

College Park, May 4, 2005.

310. Creep and fracture in concrete structures at high temperature (delivered in Czech), Institute of Structural Mechanics, Faculty of Civil Engineering, Czech Technical University, Prague, May 24, 2005.

311. Necessity of Reform of Reliability Concepts for Quasibrittle Structures (delivered in Czech), Institute of Structural Mechanics, Faculty of Civil Engineering, Brno University of Technology, Brno, Czech Republic, May 25, 2005.

312. Microplane model M5f for nonlinear tri-axial behavior of fiber reinforced concrete (presented by co-author A. Beghini), 2005 Joint ASME/ASCE/SES Conf. on Mechanics of Materials (MacMat2005), Baton Rouge, Louisiana, June 2, 2005.

313. Revision of reliability concepts for quasibrittle structures and size effect on probability distribution of structural strength (co-author S. Pang), 9th Int. Conf. on Structural Safety and Reliability (ICOSSAR 2005), Università "La Sapienza", Rome, Italy, June 20, 2005.

314. Role of deterministic and statistical length scales in size effect for quasibrittle failure at crack initiation (co-authors M. Vořechovský and M. Novák), 9th Int. Conf. on Structural Safety and Reliability (ICOSSAR 2005), Università "La Sapienza", Rome, Italy, June 20, 2005.

315. Why is the initial trend of deflections of box girder bridges deceptive? (presenter V. Krístek, co-authors Bažant, M. Zich, A. Kohoutková), 7th Int. Conf. on Creep, Shrinkage and Durability of Concrete and Concrete Structures (Concreep 7), Ecole Centrale de Nantes, France, Sept. 12, 2005.

316. How to Improve design against size effect in beam shear in ACI-318, Meeting of ACI Committee 445, Shear and Torsion, ACI Fall Convention, Kansas City, Nov. 7, 2005.

317. Lattice-cell approach to quasibrittle fracture modelling (presenter: P. Grassl, co-authors Bažant and G. Cusatis), Conf. on Computational Modelling of Concrete Structures (EURO-C 2006), Mayrhofen, Austria, March 27, 2006.

318. Size effect on compression fracture of concrete with or without V-notches: a numerical meso-mechanical study (presenter G. Cusatis, co-author Bažant), *ibid.* March 30, 2006.

319. Size effects on strength and energy absorption in delamination fracture and skin wrinkling in sandwich structures with imperfections (co-author P. Grassl), 2006 ONR Review, Solid Mechanics Research Program: Marine Composites and Sandwich Structures, Inn and Conference Center, University of Maryland, College Park, May 17, 2006.

320. Effect of size on cohesive delamination fracture triggered by sandwich skin wrinkling (co-author P. Grassl), ASME Int. Mechanical Engrg. Congress, Hilton, Chicago, Nov. 9, 2006.

321. Statistical mechanics of safety factors (co-

author S.D. Pang), ASME Int. Mechanical Engrg. Congress, Hilton, Chicago, Nov. 10, 2006.

322. Probabilistic theory of fracture of brittle heterogeneous materials based on activation energy and Maxwell-Boltzmann statistics. Nano- and Micro-Scale Mechanics of Engineering Materials and Biological Systems (in honor of S. Suresh), Norton's Woods Conf. Center, Am. Academy of Arts & Sciences, Cambridge, MA, Nov. 29, 2007

323. Size effect (presented by co-author A. Waas), ACC Energy Research Meeting, USCAR Headquarters, Southfield, MI, Jan. 18, 2007.

324. Research on constitutive models for granular materials at Northwestern University, AFOSR Workshop on Particulate Mechanics in Extreme Environments, Univ. of Florida Res. & Engrg. Facility (REEF), Eglin Air Force Base, Valparaiso, FL, Jan. 23, 2007.

325. Size effect on cohesive delamination fracture triggered by sandwich skin wrinkling (presented by co-author P. Grassl), 15th UK Conf. of the Assoc. of Computational Mechanics in Engrg., University of Glasgow, Scotland, UK, April 2, 2007.

326. Mechanics-based statistical prediction of structure size and geometry effects on resistance safety factors, with application to fiber composites and other quasibrittle structures (AIAA-2007-1972), 48th AIAA/ASME/ASCE/AHS/ASC Structures, Structural Dynamics and Materials Conf., Sheraton Waikiki, Honolulu, Hawaii, April 23, 2007.

327. Size effects in textile composites: Modeling energy dissipation in braided composites. ACC Energy Research Meeting, USCAR Headquarters, Southfield, MI, May 17, 2007.

328. Nano-based reformulation of Weibull statistical strength theory for composites and other quasibrittle materials, with consequences for lifetime. NSF Symp. on Mechanics of Composites in the Era of Energy and Nanotechnology (in honor of G.J. Dvorak), May 21, 2007.

329. Recent progress in energetic probabilistic scaling laws for quasibrittle fracture. IUTAM Symp. on "Scaling in Solid Mechanics", Cardiff University, Cardiff, Wales, UK, June 28, 2007.

330. Statistical mechanics of reliability of brittle and quasibrittle structures and size dependence of understrength safety factors (presented by co-author S.-D. Pang). 10th Int. Conf. on Applications of Statistics and Probability in Civil Engrg. (ICASP10), Aug. 2007, Tokyo, Japan.

331. Dependence of size effect law for quasibrittle materials on loading duration (presented by co-author Jia-Liang Le), 10th Pan American Congress of Applied Mechanics, Jan. 2008, Cancún, Mexico.

332. Mesomechanical multiscale elastic-fracturing model for braided composites (co-authors: F. Caner, C. Hoover). 49th AIAA/ASME/ASCE/AHS/ASC Structures, Structural Dynamics and Materials Conf., April 8, 2008, Schaumburg, Illinois.

333. Size effect on strength of hybrid metal-composite joints (co-authors, F. Caner, J.-L. Le, Q. Yu). 49th AIAA/ASME/ASCE/AHS/ASC Structures, Structural Dynamics and Materials Conf., April 9, 2008, Schaumburg, Illinois.
334. Atomistically based prediction of size effect on strength and lifetime of composites and other quasibrittle structures (presented by co-author Jia-Lian Le). 49th AIAA/ASME/ASCE/AHS/ASC Structures, Structural Dynamics and Materials Conf., April 10, 2008, Schaumburg, Illinois.
335. Unbiased statistical comparison of creep and shrinkage prediction models. Meeting of ACI Committee 209, Creep and Shrinkage, ACI Spring Convention, March 31, 2008, Los Angeles.
336. Problems with nonstandard regression statistics in database evaluations of design equations. Meeting of ACI Committee 348, Structural Safety, ACI Spring Convention, March 31, 2008, Los Angeles.
337. Size effect in textile composites: elasticity and fracture of braided composites (co-author A. Waas). ACC (Automobile Composites Consortium) Energy Management meeting, USCAR Headquarters, May 8, 2008, Southfield, Michigan.
338. Consequences of fracture mechanics for size effect, crack spacing, and crack width in concrete pavements. 6th RILEM Int. Conf. on Cracking in Pavements, Holiday Inn, Chicago, June 16, 2008.
339. Size effect on probability of quasibrittle failure and lifetime: from atomistic to structural scale (presented by co-author S.-D. Pang), 22nd Int. Congr. of Theor. & Appl. Mech. (XXII ICTAM), Adelaide, Australia, August 27, 2008.
340. Size effect: What is the rationale and penalty for neglect, 17th Congress of IABSE, Chicago, Sept. 18, 2008.
341. Misprediction of long-time deflections of prestressed box girders: Causes, remedies and tendon layout effect (V. Kristek, L. Vrablik - presenter, Z.P. Bazant, G.-H. Li and Q. Yu), 8th Int. Conf. on Creep, Shrinkage and Durability of Concrete and Concrete Structures (CONCREEP-8), Ise-Shima, Japan, Oct. 1, 2008.
342. The problem of non-disclosure of technical data from major structural failures, presentation in the Civil Eng. Section Meeting, National Academy of Engng. Annual Meeting, Oct. 6, 2008.
343. Size effect on strength of bi-material joints for hybrid ship hulls (J.-L. Le - presenter, Z.P. Bazant, Q. Yu and F.C. Caner) Soc. of Engng. Science 45th Annual Techn. Meeting, Univ. of Illinois, Urbana, Oct. 14, 2008.
344. Zig-zag representative unit cell for discrete modeling of fracturing and size effect in two-dimensional triaxially braided composites (C.G. Hoover - presenter, F.C. Caner, Z.P. Bazant), Soc. of Engng. Science 45th Annual Techn. Meeting, Univ. of Illinois, Urbana, Oct. 14, 2008.
345. Light, strong and safe composites for fuel-efficient transportation, Meeting of CEET (Center for Energy-Efficient Transportation), Northw. Univ., Oct. 23, 2008.
346. Size effect on strength of bimaterial joints of steel with fiber-polymer composite (with J.-L. Le, F.C. Caner and Q. Yu), ASME Intern. Mechanical Engng. Congress, Boston, Nov. 6, 2008.
347. Analysis of causes of excessive long-time deflections of the prestressed box girder bridge in Palau, presentation to ACI-209 Committee meeting, ACI Spring Convention, San Antonio, TX, March 16, 2009.
348. Explanation of excessive long-time deflection of collapsed record-span box girder bridge in Palau, SEA01 Midwest Bridge Symposium, Chicago, April 23, 2009.
349. Size effects in textile composites, Contractors' Research Review Semi-Annual Meeting, Automotive Composite Consortium (ACC), USCAR Headquarters, Southfield, MI, April 28, 2009.
350. Size effect on strength and lifetime distributions of quasibrittle structures implied by atomistic fracture mechanics (with J.-L. Le and M.Z. Bazant), Joint ASCE-ASME-SES Conf. on Mechanics and Materials (Mech09), VPI, Blacksburg, VA, June 26, 2009.
351. Size effect on strength of bimaterial joints: Computational approach versus analysis and experiment (J.-L. Le - presenter, F.C. Caner, Q. Yu, Z.P. Bazant), 12th Int. Conf. on Fracture (ICF12), Ottawa, Canada, July 15, 2009.
352. Numerical simulation of fracture and size effect in braided composites, Contractors Research Review Semi-Annual Meeting, ACC (Automotive Composites Consortium), Southfield, MI, Oct. 26, 2009.
353. Size effect on strength and lifetime distributions of quasibrittle structures (co-author J.-L. Le), ASME Intern. Mechanical Engng. Congress, Lake Buena Vista, Florida, Nov. 17, 2009.
354. How to enforce non-negative energy dissipation in microplane and other constitutive models for softening damage, plasticity and friction (co-authors J.-Y. Wu, F.C. Caner & G. Cusatis), EURO-C (Computational Modeling of Concrete Structures), Rohrmoos/Schladming, Austria, March 18, 2010.
355. Misconceptions on variability of fracture energy, its uniaxial definition by work of fracture, and its presumed dependence on crack length and specimen size. 7-th Inter. Conf. on Fracture Mechanics of Concrete and Concrete Structures (FraMCoS-7), Jeju, Korea. May 24, 2010.
356. Nonlocal boundary layer (NBL) model: Overcoming boundary condition problems in strength statistics and fracture analysis of quasibrittle materials (with J.-L. Le and C.G. Hoover)
357. Nonlocal boundary layer (NBL) model for the analysis of quasibrittle structures (with G.C. Hoover & J.-L. Le), U.S. National Congress of Theor.

- & Appl. Mech. (USNC-TAM), Pennsylvania State University (PennState), State College, PA, June 28, 2010.
358. Numerical simulation of braided composites via embedded representative unit cell or microplane model [with V. Smilauer, F.C. Caner & G.C. Hoover (presenter)], U.S. National Congress of Theor. & Appl. Mech. (USNC-TAM), Pennsylvania State University (PennState), State College, PA, July 1, 2010.
359. Nano-mechanics based modeling of strength and lifetime statistics of quasibrittle structures (co-author J.-L. Le). ASCE Engrg. Mechanics Institute Conf. (EMI2000), University of Southern California, Los Angeles, Aug. 9, 2010.
360. Size effect on probability distribution of fatigue lifetime of quasibrittle structures (co-author J.-L. Le). ASCE Engrg. Mechanics Institute Conf. (EMI2000), University of Southern California, Los Angeles, Aug. 9, 2010.
361. Misconceptions on determining cohesive softening and its non-uniqueness obtained by work-of-fracture test (co-author Q. Yu). ASCE Engrg. Mechanics Institute Conf. (EMI2000), University of Southern California, Los Angeles, Aug. 10, 2010.
362. Paradigm of disastrous creep and hygrothermal effects in concrete and some implications of nano-porosity (co-author Q. Yu). ASCE Engrg. Mechanics Institute Conf. (EMI2000), University of Southern California, Los Angeles, Aug. 10, 2010.
363. Evolution of deflections of prestressed bridges of large spans as a basis for calibrating prediction models for concrete creep (co-authors V. Křístek and V. Vráblík), presented by Křístek at Betonařské dny 2010 (Concrete Days), held in Hradec Králové, Czech Rep., Nov. 2010.
364. Nano-mechanics based theory of lifetime statistics of quasibrittle structures under static and cyclic fatigue. ASME International Mechanical Engineering Congress, Vancouver, BC, Canada, Nov. 16, 2010.
365. Excessive bridge deflections and their inverse analysis: Overview of Some Latest Results and Work in Progress, Presentation and Infrastructure Technology Institute Meeting, Northwestern University, Feb. 7, 2011.
366. Consequences of long-term bridge deflections data for the creep prediction model, Meeting of ACI-Committee 209, Creep and Shrinkage of Concrete, Am. Concr. Inst. Spring Convention, Tampa, FL, April 4, 2011.
367. Excessive multi-decade deflections of prestressed concrete bridges: How to avoid them and how to exploit their monitoring to improve creep prediction model. *fib* Symposium Prague 2011 "Concrete Engineering for Excellence and Efficiency", June 8, 2011.
368. Large sandwich panels for lightweight ship hulls: Buckling with fracture and size effect. ONR (Office of Naval Research) Program Review Meeting, Arlington, VA, July 12, 2011.
369. Size effect on probability distributions of fatigue lifetime of quasibrittle structures (presented by co-author Jia-Liang Le). ICASP 11 (11th Int. Conf. on Applications of Statistics and Probability in Civil Engineering). ETH Zürich, August 3, 2011.
370. Microplane model M6f for fiber-reinforced concrete (presented by co-author F. Caner), 11th Int. Conf. on Computational Plasticity—Fundamentals and Applications (COMPLAS XI), UPC, Barcelona, Sept. 8, 2011.
371. Myth and reality of multiscale modeling of concrete and other quasi-brittle materials (presented by co-author G. Cusatis), 14th Intern. Symp. on Interaction of the Effects of Munitions with Structures, Renaissance Seattle Hotel, Seattle, Sept. 20, 2011.
372. Size effect on sandwich plates with imperfections caused by cohesive delamination fracture triggered by skin wrinkling (co-authors M. Gattu and P. Grassl), ASME Intern. Mechanical Engrg. Congress and Exp., Denver, Nov. 17, 2011.
373. Non-uniqueness in softening damage and cohesive fracture models for concrete or bone caused by ignoring the size effect, ASCE Structures Congress, Chicago, March 30, 2012.
374. Large sandwich panels for lightweight ship hulls: Buckling with fracture and size effect. Office of Naval Research (ONR) Review Meeting on "Ship Hull Structures", Arlington, VA, May 15, 2012.
375. Size effect in bone fracture and its use to avoid non-uniqueness of cohesive stress-separation law (presented by co-author K.T. Kim), EMI/PMC (2012 Joint Conf. of Eng. Mech. Inst. and 11th Joint Specialty Conf. on Probab. Mechanics and Struct. Reliability), Univ. of Notre Dame, South Bend, IN, June 18, 2012.
376. Snap-through instabilities as a cause of sorption hysteresis and misfit disjoining pressure in hydrated cement and other nanoporous solids (co-authors M. Hubler and M.Z Bazant), *ibid.* June 18, 2012.
377. Corrections to ABAQUS, ANSYS, LS-DYNA and other FE Codes required by work-conjugacy and orthotropy effects in finite strain and stability analyses (co-authors M. Gattu and J. Vorel), *ibid.* June 18, 2012.
378. Uncertainty in creep and shrinkage prediction models for concrete (presented by co-author R. Wendner, co-author M. Hubler), *ibid.*, June 19, 2012.
379. Computation of scale effects on structural safety of quasibrittle structures presented by co-author J.-L. Le, co-author Jan Eliáš), *ibid.*, June 20, 2012.
380. Model B3.1 for multi-decade concrete creep and shrinkage: Calibration by combined laboratory and bridge data (presented by co-author R. Wendner), IALCCE 2012 (Intern. Assoc. for Life-Cycle Civil Engineering), Vienna, Oct. 12, 2012.

381. Experimental investigation of transitional size effect and crack length effect in concrete fracture (presented by co-author R. Wendner), IALCCE 2012 (Intern. Assoc. for Life-Cycle Civil Engineering), Vienna, Oct. 12, 2012.
382. Snap-through instabilities as a cause of sorption hysteresis and misfit disjoining pressures in hydrated cement and other nanoporous solids. SES (Society of Engineering Science 49th Annual Meeting), Georgia Tech, Atlanta, Oct. 11, 2012.
383. Scaling of probability distributions of strength and lifetime of quasibrittle structures. Workshop on “Advances in Computational Mechanics with Emphasis on Fracture and Multiscale phenomena”, honoring Prof. T. Belytschko on His 70th Birthday. April 19, 2013, Hilton Garden Inn, Evanston, IL.
385. Recalibration and uncertainty quantification of the B3 creep model for long-term estimates using Bayesian methods (presented by co-author R. Wendner). ICOSSAR 2013 (11th Int. Conf. on Struct. Safety & Reliability), Columbia University, New York, June 17, 2013.
386. Scaling of statistics of strength and lifetime of quasibrittle structures: Problems and progress. ICOSSAR 2013 (11th Int. Conf. on Struct. Safety & Reliability), Columbia University, New York, June 18, 2013.
387. Scaling of failure probability of quasibrittle structures with large cracks, ditto, June 18, 2013.
388. Development and validation of model B4 for concrete creep and shrinkage (presented by co-author R. Wendner). EMI 2013 (ASCE Engrg. Mechanics Institute Conf.), Northwestern University, Evanston, IL, August 5, 2013.
389. Microplane finite element analysis of alkali-silica reaction (presented by co-author An Duan); ditto, August 6, 2013.
390. Statistical distribution of residual strength after a period of constant load and size effect (presented by co-author M. Salviato); ditto, August 6, 2013.
391. Fracture and size effect on strength of plain concrete disks under biaxial flexure analyzed by microplane model M7 (presented by co-author K. Kirane); ditto, August 6, 2013.
392. A microplane damage model for rocks (presented by co-author Xin Chen); ditto, August 6, 2013.
393. Theory of cyclic creep of concrete based on fatigue of subcritical microcracks (presented by co-author M.H. Hubler); ditto, August 6, 2013.
394. The B4 model for multi-decade creep and shrinkage prediction (presenter R. Wendner, co-author), 9th Int. Conference of Creep, Shrinkage and Durability Mechanics of Concrete and Concrete Structures, Cambridge, MA, Sept. 23, 2013.
395. Viscoplastic constitutive relation for relaxation of prestressing steel at varying strain and temperature (presenter Qiang Yu, co-author), 9th Int. Conference of Creep, Shrinkage and Durability Mechanics of Concrete and Concrete Structures, Cambridge, MA, Sept. 23, 2013.
396. Improved estimation of long-term relaxation function of aging concrete from its compliance function (presenter M.H. Hubler, co-author), 9th Int. Conference of Creep, Shrinkage and Durability Mechanics of Concrete and Concrete Structures, Cambridge, MA, Sept. 23, 2013.
397. Statistical distribution and size effect of residual strength after a period of sustained constant load (presenter M. Salviato), ASME Int. Mechanical Engineering Congress & Exposition, San Diego, CA, Nov. 18, 2013.
398. Impact comminution of quasibrittle materials under high-rate shear (presenter M. Salviato), ASME International Mechanical Engineering Congress & Exposition, San Diego, CA, Nov. 20, 2013.
399. Effect of varying strain and temperature on prestress loss due to steel relaxation, ACI Fall Convention, Phoenix, AZ, Oct. 21, 2013.
400. Cyclic creep of concrete, ACI-209 Meeting at ACI Fall Convention, Phoenix, AZ, Oct. 21, 2013.
401. Statistical distribution and size effect of residual strength after a period of sustained cyclic load, Seminar, University of Queensland, Brisbane, Australia, Dec. 5, 2013.
402. Solid comminution due to kinetic energy of high-rate shear: Turbulence analogy, impact, shock and shale fracturing, Seminar, School of Engineering, University of Sydney, Australia, Dec. 6, 2013.
403. Probabilistic nano-mechanical theory of quasibrittle structure strength, crack growth, lifetime and fatigue, Seminar, Center for Infrastructure Engrg. & Safety, School of Civil and Environmental Engineering, University of New South Wales, Sydney, Australia, Dec. 9, 2013.
404. Solid comminution due to kinetic energy of high-rate shear: Turbulence analogy, impact, shock and shale fracturing, Seminar, School of Engrg., Monash University, Melbourne, Australia, Dec. 13, 2013.
405. Energy conservation errors in finite elements softwares caused by energy-inconsistent objective stress rates, 20th Int. Symposium on Plasticity and its Current Applications, Freeport, Bahamas, Jan. 5, 2014.
406. Model B4: multi-decade and shrinkage prediction of traditional and modern concretes (presenter R. Wendner, co-author), EURO-C 2014 (Computational Modelling of Concrete and Concrete Structures), St. Anton am Arlberg, Austria, Mar. 24, 2014.
407. Statistical distribution and size effect of residual strength after a period of sustained load (M. Salviato, K. Kirane, co-authors), EURO-C 2014 (Computational Modelling of Concrete and Concrete

- Structures), St. Anton am Arlberg, Austria, Mar. 26, 2014.
408. Microprestress-solidification theory; modelling of size effect on drying creep (presenter P. Havlásek, co-author), EURO-C 2014 (Computational Modelling of Concrete and Concrete Structures), St. Anton am Arlberg, Austria, Mar. 26, 2014.
409. Enhanced microplane constitutive model for sub-critical crack growth and size effect under cyclic loading in isotropic quasibrittle materials (presenter K. Kirane, co-author), 17th National Congress of Theoretical and Applied Mechanics, East Lansing, MI, Jun. 16, 2014.
410. Solid comminution due to kinetic energy of high-rate shear: Turbulence analogy, impact, shock and shale fracturing, 17th National Congress of Theoretical and Applied Mechanics, East Lansing, MI, Jun. 17, 2014.
411. Multi-scale microplane model for fracturing damage of woven composites (presenter K. Kirane, co-author), 17th National Congress of Theoretical and Applied Mechanics, East Lansing, MI, Jun. 19, 2014.
412. Comminution of solids due to kinetic energy of high shear strain rate: Implications for shock and shale fracturing, ASCE Shale Energy Engineering Conference, Pittsburgh, PA, Jul. 22, 2014.
413. Shale fracturing for energy recovery: Current issues and review of available analytical and computational models (presenter G. Buscarnera, co-author), ASCE Shale Energy Engineering Conference, Pittsburgh, PA, Jul. 22, 2014, Presenter Only
414. Continuum modeling of damage to concrete structures caused by alkali-silica reaction, ASCE Engineering Mechanics Institute Conference, McMaster University, Ontario, Canada, Aug.6, 2014.
415. Multi-scale microplane model for fracturing damage of woven composites (presenter M. Salviato, co-author), ASCE Engineering Mechanics Institute Conference, McMaster University, Ontario, Canada, Aug.6, 2014.
416. Microplane constitutive damage model for subcritical fatigue crack growth and scaling of quasibrittle materials (presenter K. Kirane, co-author), ASCE Engineering Mechanics Institute Conference, Ontario, Canada, Aug.6, 2014.
417. Comparison of Main Models for Size Effect on Shear Strength of Reinforced and Prestressed Concrete Beams, presented in ACI-445 Meeting, Washington, D.C., Oct. 27, 2014.
418. Multiscale Microplane Model for Fracturing Damage of Woven Composites, ASME 2014 Int. Mech.Eng. Congress & Exp., Montreal, Nov. 18, 2014.
419. Constitutive Damage Model for Subcritical Fatigue Crack Growth and Size Effect in Isotropic Quasibrittle Materials (presented by co-author Kedar Kirane), ASME 2014 Int. Mech.Eng. Congress & Exp., Montreal, Nov. 18, 2014.
420. Spectral Stiffness Decomposition Microplane Model: Prediction of Crashworthiness of a Woven Composite Crash Can (presented by co-author M. Salviato), ASME 2014 Int. Mech. Eng. Congress & Exp., Montreal, Nov. 18, 2014.
421. Infrastructure Materials: Probabilistic Science of Quasi-Brittle Behavior, NU-NIMS Materials Genome Workshop, Center of Hierarchical Materials Design, Northwestern University, Evanston, IL, March 25, 2015.
- 421*. Misleading statistics of test data on size effect in beam shear, (co-ator R. Wendner), ACI Spring Convention, Kansas City, MO (presented in ACI-445 meeting), April 13, 2015.
422. Problems with Recent Statistics of Errors of Creep and Shrinkage Models in the Light of 3-D FE Creep Analysis of Palau and Other Bridges, ACI Spring Convention, Kansas City, MO (presented in ACI-209 meeting), April 14, 2015.
423. Why Fracking Works and Why Not Well Enough, Workshop on Hydraulic Fracturing: From Modeling and Simulation to Reconstruction and Characterization, University of Minnesota, Minneapolis, MN, May 12, 2015.
424. Impact Comminution of Solids Due to Progressive Crack Growth Driven by Kinetic Energy of High-Rate Shear, Int. Conf. on Computational Modeling of Fracture and Failure of Materials and Structures (CFRAC-4) 2015, Cachan, France, June 4, 2015.
425. Microplane Model for Fracturing Damage of 3D Braided Composites (presented by co-author M. Salviato), ASCE Eng. Mech. Inst. Conf. (EMI), Stanford University, Stanford, CA, June 17 2015.
425. Experimental and Numerical Analysis of Intra- and Inter-Laminar Size Effect in Composite Materials (presented by co-author K. Kirane), ASCE Eng. Mech. Inst. Conf. (EMI), Stanford University, Stanford, CA, June 17 2015.
427. Creep of Water -Saturated Nanometric Slit Pores: Application to Cement (presented by co-author M. Vandamme), ASCE Eng. Mech. Inst. Conf. (EMI), Stanford University, Stanford, CA, June 17 2015.
428. Crack Band Approach to Model 3D Hydraulic Fracturing of Gas Shale Stratum, 49th U.S. Rock Mechanics Geomechanics Symposium, American Rock Mechanics Association (ARMA), San Francisco, CA, June 29, 2015.
429. Nanomechanics Based Theory of Size Effect on Strength, Lifetime and Residual Strength Distributions of Quasibrittle Failure: A Review (presented by co-author M. Salviato), 12th Int. Conf. on Applications of Statistics and Probability in Civil Engineering (ICASP-12), Vancouver, Canada, July 13, 2015.
430. Localization and Spacing of Hydraulic Cracks in Shale and Estimation by Inverse Analysis

- of Observed Gas Flux , Bažant, Z P., Grand Challenges in Geological Fluid Mechanics, Organized by LANL/DOT, Santa Fe, NM, September 2, 2015.
431. Numerical study of the creep of slit nanopores: role of water M. Vandamme, presenter; co-authors Z.P. Bažant, S. Keten), ConCreep-10, TU Wien, Vienna, Austria, September 23, 2015.
432. Size effect in Paris law for quasibrittle materials: modified theory, experiments, and modeling, K. Kirane and Z.P. Bažant (presented by co-author K. Kirane), Society for Engineering Science (SES) Annual Meeting, held Texas A&M University, October 27, 2015.
433. Direct evidence of size effect by filtering statistical sampling bias from databases on beam shear and slab punching, ACI-445 Committee Meeting at ACI Fall Meeting, Denver, CO, Nov. 9, 2015.
434. Interaction of concrete creep, shrinkage and swelling with water, hydration and damage, ACI-209 Committee Meeting at ACI Fall Meeting, Denver, CO, Nov. 9, 2015.
435. Impact Fragmentation and Crushing of Concrete and Other Solids Due to Kinetic Energy of High Shear Strain Rate (co-author K. Kirane), Am Physical Society (APS) Meeting 2016, Baltimore, MD, March 17, 2016.
436. One-Way Shear Design Method - A Unified Approach (joint presentation by R.J. Frosch and Z.P. Bažant), ACI Spring Meeting, Milwaukee, WI, April 17, 2016
- 435*. Size effects in torsion and slab flexure, compared to punching and beam shear: Why are they of different types, I and II? (co-authors A. Dönmez, K. Kirane and G. Zi), ACI Spring Meeting, Milwaukee, WI, April 18, 2016
437. Size Effects in torsion and slab flexure, compared to punching and beam shear: Why are they of different types, I and II?, ACI Committee 445 Meeting, ACI Spring Meeting, Milwaukee, WI, April 18, 2016
438. Strain rate dependent microplane constitutive model for comminution of concrete under projectile impact, Z.P. Bažant, presenter, and K. Kirane, ASCE EMI (Eng. Mech. Inst.) and Probab. Mech. (PMC) Conference, Vanderbilt Univ., Nashville, TN, May 24, 2016.
439. Residual strength of preloaded quasibrittle structures and size effect on its statistical distribution based on nanomechanics, Z.P. Bažant, presenter, K. Kirane and M. Salviato, ASCE EMI (Eng. Mech. Inst.) and Probab. Mech. (PMC) Conference, Vanderbilt Univ., Nashville, TN, May 24, 2016.
440. Structural size effect in Paris law for fatigue crack growth in quasibrittle materials, Z.P. Bažant, presenter, and K. Kirane, FraMCoS-9 (9th Int. Conf. on Fracture Mech. of Concrete and Concrete Str.), Berkeley, CA, May 30, 2016.
441. Mechanistic Modeling of Strength Distribution of Quasibrittle Structures and Its Implication of Structural Reliability, Jia-Liang Le, presenter, and Z.P. Bažant, FraMCoS-9 (9th Int. Conf. on Fracture Mech. of Concrete and Concrete Str.), Berkeley, CA, May 30, 2016.
442. Strain rate dependent microplane constitutive model for comminution of concrete under projectile impact, Z.P. Bažant, presenter, and K. Kirane, FraMCoS-9 (9th Int. Conf. on Fracture Mech. of Concrete and Concrete Str.), Berkeley, CA, May 30, 2016.
443. Vast system of dense intersecting fractures: A key feature of hydraulic fracturing of gas shale, 50th US Rock Mechanics/Geomechanics Symposium ARMA (Am. Rock Mech. Assoc.), Houston, TX, June 28, 2016.
444. Structural size effect in Paris law and fatigue lifetimes in quasibrittle materials, 17th International Conference on Experimental Mechanics (ICEM-17), Rhodes, Greece, July 5, 2016.
445. Diffusion-controlled and creep-mitigated asr damage in concrete via microplane model, S. Rahimi-Agham, presenter, and Z.P. Bažant, 7th Am. Ceramics Soc. (ACS) Conf. on Advances in Cement-Based Materials, Northwestern University, Evanston, IL, July 11, 2016.
446. Multi-year model for autogenous and drying shrinkage interaction and swelling in water based on expansive solid skeleton during hydration, S. Rahimi-Agham (presenter), Z.P. Bažant, Z and M.J.A. Qomi, M.J., 7th Am. Ceramics Soc. (ACS) Conf. on Advances in Cement-Based Materials, Northwestern University, Evanston, IL, July 12, 2016.
447. Energetic argument why the size effect on nominal strength cannot be stronger than $(size)^{-1/2}$, ACI Comm. 445 Meeting, American Concrete Institute Convention, Philadelphia, PA, October 24, 2016.
448. Energetic-statistical size effects on strength in beam torsion and in biaxial flexure, ACI Comm 446 Meeting, American Concrete Institute Convention, Philadelphia, PA, October 24, 2016
449. Size Effect on Punching Shear Strength of RC Slabs without and without and with Shear Reinforcement, Symposium Honoring Neil Hawkins' 80th Birthday, American Concrete Institute Convention, Philadelphia, PA, October 25, 2016
450. Size effect equation and shear failure probability: what is known?, Joint ASCE/ACI Committee 445 - Shear and Torsion Spring 2017 Meeting, Detroit, MI March 26, 2017
451. Size effect equation and shear failure probability: what is known?, Joint ASCE/ACI Committee 445 - Shear and Torsion Spring 2017 Meeting, Detroit, MI March 26, 2017
452. Spherocylindrical Microplane Constitutive Model for Damage: A way to Capture Orthotropy of Shale and Other materials, ASCE-EMI 2017, San

Diego, CA, June 6, 2017

453. Experimental Analysis of Fracturing Damage of Fiber Composites (presented by co-author V.T. Chau), ASCE-EMI 2017, San Diego, CA, June 6, 2017

454. Modification of Microprestress-Solidification theory (presented by co-author S. Rahimi-Aghdam), ASCE-EMI 2017, San Diego, CA, June 7, 2017

455. Numerical and Theoretical Analysis of Comprehensive Concrete Fracture Tests (presented by co-author C. Hoover), 14th International Congress of Fracture, Rhodes, Greece, June 19, 2017

456. Impact Fracturing of Materials Driven by the Release of Kinetic Energy of Shear Strain Rate Fields of Forming Particles, 14th International Congress of Fracture, Rhodes, Greece, June 21, 2017

457. Size-Effect Experiments for Characterization of Fracture Properties of Composites (presented by G. Cusatis, main author), 3rd International Conference on Mechanics of Composites, Bologna, Italy, July 4-7, 2017

Intensive Short Courses Taught Abroad

1. Royal Institute of Technology, Sweden, Sept. 1977.
2. Politecnico di Milano, June 1978.
3. National University of Mexico, Sept. 1978.
4. Technical University, Vienna, June 1979.
5. Ecole des Ponts et Chaussées, Paris, Sept. 1980 (given in French - 5 day course).
6. Politecnico di Milano, June 1982.
7. Lausanne, Switzerland, Sept. 1987 (5 day, 24-hour course).
8. Fracture mechanics of concrete, with ramifications to rock and ceramics (24 lecture hours), Swiss Federal Institute of Technology, Lausanne, September 25-29, 1989.
9. Fracture and Damage in Concrete Structures, Technische Universität Stuttgart, Sept. 3-5, 1990 (2-day, 12 hour course).
10. Politecnico di Milano, Feb. 1993 (4 day, 24 hour course).
11. Lausanne, Switzerland, March 1996 (4 day, 24 hour course).
12. Lulea University, Sweden, Sept. 1995 (4 day, 24 hour course).
13. Politecnico di Milano, Italy, Sept. 1996 (4 day, 24 hour course).
14. University of Palermo, Sicily. Sept. 14-16, 1998 (3-day, 18 hour course).
15. Localization instabilities, fracture and size effects in quasi-brittle materials, ETSECCPB, Universitat Politècnica de Catalunya (UPC), Barcelona, Spain, March 17, 18, 22, 23, 24, 25, 1999 (18 hour course).
16. Fracture, damage localization and size effects in quasibrittle structures. Politecnico di Milano, Italy, April 3-7, 2000 (21 hour course)
17. Cohesive fracture, scaling, statistics and asymptotics: Basic ideas and recent progress, Dipartimento di Ingegneria Strutturale, Politecnico di Milano, Italy, June 27-28, 2005 (12 hour course).

Conferences in Honor of Bažant

1. Prager Medal Symposium, SES Annual Meeting, Tempe, AZ, 1996.

2. Workshop on Mechanics of Quasi-Brittle Materials and Structures Honoring Bažant at his 60th Birthday, CTU, Prague, sponsored by EDF France, org. by G. Pijaudier-Cabot, Zdeněk Bittnar and Bruno Gérard, 1997.

3. 60th Birthday Symposium and celebration at conference dinner cruise, at FraMCoS-3, Gifu, Japan 1998.

4. 65th Birthday Conference Dinner at EURO-C, Saint Johann in Pongau, Austria.

5. Pre-conference Workshop, and Symposium, at ECCOMAS Thematic Conference on Mechanics of Heterogeneous Materials, honoring Bažant at his 70th birthday, Prague, June 24 and 26, 2007 (with dinner in Hanavsky Pavilion).

6. Asian Special Workshop on Concrete Technology in Honor of the 70th Birthday of Prof. Zdeněk P. Bažant, chaired by Ta-Peng Chang and Jenn-Chuann Chern at TCI Annual Meeting, Taiwan National University, Nov. 7, 2008, Taipei, Taiwan, and dinner hosted by Samuel Yin in Ruentex Tower.

8. Symposium in Honor of Zdeněk Bažant at his 70th Birthday (chaired by H. Espinosa), Mech09—Joint ASCE-ASME-SES Mechanics and Materials Conference, VPI, Blacksburg, VA, June 25, 2009.

9. Symposium honoring Prof. Bažant at His 75th Birthday, EMI/PMC (2012 Joint Conf. of Eng. Mech. Inst. and 11th Joint Specialty Conf. on Probab. Mechanics and Struct. Reliability), org. by Christian Hellmich et al., Univ. of Notre Dame, South Bend, IN, June 18, 2012.

10. Symposium honoring Prof. Z.P. Bažant at His 75th Birthday, "From Nanopores to Large Structures: A Life Time Journey across Length Scales." SES (Society of Engineering Science 49th Annual Meeting), org. by Gianluca Cusatis, Georgia Tech, Atlanta, Oct. 10, 2013.

11. Symposium on 'Damage and Fracture of Quasibrittle Materials' (chaired by I. Carol and G. Pijaudier-Cabot). "Dedicated to the 75th anniversary of Prof. Bažant", with dinner in (Frank Gehry's) "Dancing House" in Prague; CFRAC-3 Conf. at CTU Prague, June 7, 2013.

12. Conference dedicated to, and dinner honoring, Bažant; ConcCreep-9, held at MIT, Cambridge,

Sept. 24, 2013.

13. Symposium in honor of Bažant's 80th birthday, org. by Huajian Gao and Yonggang Huang, followed by dinner in San Diego Wine and Culinary Center, at Annual Meeting of ASCE Engineering Mechanics Institute (EMI), San Diego (Omni hotel), June 5, 2017.

14. Symposium in honor of Bažant's 80th birthday, org. by Hanchen Huang and Nadine Aubry, at Society of Engineering Science (SES) 53rd Annual Meeting, Northeastern University, Boston, MA, on July 26, 2017.