VICTOR E. SAOUMA

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Personal Data

Married, (three children)
English, French, Italian, Spanish, Arabic
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December 28, 1953 Bogota Colombia
880 Gapter Road
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Professional Experience

- *Professeur des universités*, France, 2012-
- Visiting Professor, Swiss Federal Institute of Technology (Lausanne), Civil Engineering (Sept. Dec. 2011).
- Former Director and Principal Investigator of the George E. Brown, Jr. Network for Earthquake Engineering Simulation (NEES), NSF Center on Fast Hybrid Test at the University of Colorado, Boulder; 2006-2009.
- Visiting Professor, (typically 1 summer month): *Université de Toulouse* (2009), Politecnico of Catalunya, (2007, 2010); Ecole Normale Supérieure de Cachan, (1992, 1994, 2007);
- Visiting Professor, *Politecnico di Milano*, Department of Structural Engineering, 2003-2004.
- Visiting Professor, Swiss Federal Institute of Technology (Lausanne), Civil Engineering (January-June 1990); Material Science Department, 1997-1998.
- Professor (1995 to present), Associate Professor (1988-1995), Assistant Professor (1984-1988), Department of Civil, Environmental, and Architectural Engineering, University of Colorado, Boulder.
- Assistant Professor, Department of Civil Engineering, University of Pittsburgh, Pittsburgh, PA, Sept. 1981-Dec. 1983.
- Research Associate, Department of Civil Engineering, Princeton University, Princeton, N.J., Oct. 1980 - Aug. 1981.

Relevant Committee Memberships

- President, 2013-2016, (and Fellow) of the *International Association of Fracture Mechanics for Concrete and Concrete Structures* (IA-FraMCOs).

- Chairman, 2015-2019, of the RILEM committee on *Prognosis of deterioration and loss of serviceability in structures affected by alkali-silica reactions.*
- Past Member of the *Materials Aging and Degradation* (MAaD) External Review Committee (ORNL, Light Water Reactor Sustainability R&D Program).
- Member, 2010-2014, of the *Expanded Proactive Materials Degradation Analysis Expert Panel* (PMDA) for concrete in nuclear reactors; Nuclear Regulatory Commission.
- Past: In connection with the VeRCoRs study (1/3 model of a reactor containment building to be tested by *Electricite de France*,EdF): Member of the Scientific Committee of MACENA, *Managing confinement structures in the event of an accident.*
- Member of the Scientific Committee of OECD/NEA/CSNI CAPS ASCET - *Assessment of Structures subject to Concrete Pathologies.*

Education

- Cornell University, Ph.D. in Civil Engineering, September 1980.
- Cornell University, M.E. in Civil Engineering, January 1977.
- American University of Beirut, B.E. in Civil Engineering, June 1975.
- Lycée Chateaubriand, Rome, Baccalaureat Série Scientifique, 1971.

Research Interests

- Nonlinear (static and dynamic) analysis of major structures (nuclear containers, dams) due to aging or severe load.
- Computational and experimental (fracture) mechanics.
- Alkali Silica Reactions.
- Real time hybrid simulation.
- Large scale and innovative laboratory testing.

Teaching

Undergraduate:	**Graduate:**
Statics	Continuum Mechanics
Strength of Material	Computer Graphics
Structural Analysis	Finite Elements
Reinforced Concrete	**Fracture Mechanics**
Computer Literacy for Undergraduates	**Nonlinear Structural Analysis of Frames**
Matrix Structural Analysis	Advanced Reinforced Concrete
Structural Analysis for Architects	Prestressed Concrete

Publications

Books

1. Saouma, V,E. **Linear and Nonlinear Structural Analysis** manuscript in preparation
2. Saouma, V.E. and Hariri-Ardebili, M. (2020) Aging, Shaking and Cracking of Infrastructures; From Mechanics to Concrete Dams and Nuclear Strutures, Springer-Nature.
3. Saouma, V.E. (Ed.) (2020) Diagnosis & Prognosis of AAR Affected Structures,Springer-Nature.
4. Saouma, V.E. (2013) Numerical Modeling of AAR, 320 pages, Taylor& Francis;
5. Saouma, V. and Sivaselvan, M. (Eds) (2008) Hybrid Simulation: Theory, Implementation and Applications

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Archival Publications

101. Hariri-Ardebili, M.A., Saouma, V.E. and Hayes, N.W., 2021, **A Hybrid FE-Based Predictive Framework for ASR-Affected Structures Coupled with Accelerated Experiments** *Engineering Structures*, Vol 234, 111709. https://doi.org/10.1016/j.engstruct.2020.111709

100. Saouma, V.E., Hariri-Ardebili, M.A., Graham, L., 2020, **A Stochastic Computational Method for Global Behavior of Alkali-Silica Reaction**. *Cement Concrete and Research*, Vol. 132, 106032. https://doi.org/10.1016/j.cemconres.2020.106032

99. Saouma, V. and Hariri, M. (2019) **Integrative Experimental and Numerical Study of ASR Affected Nuclear Concrete Containment**, *Materials and Structures*, Vol. 53, No. 1. https://doi.org/10.1617/s11527-019-1433-y

98. Hariri-Ardebili, M.A., Seyed-Kolbadi, S.M., Saouma, V.E., Salamon, J.W. and Nuss, L.K., 2019, **Anatomy of the Vibration Characteristics in Old Arch Dams by Random Field Theory**, *Engineering Structures*, Vol.179, pp.460-475. https://doi.org/10.1016/j.engstruct.2018.10.082

97. Saouma, V.E. and Hariri-Ardebili, M.A., 2019, **Seismic capacity and fragility analysis of an ASR-affected nuclear containment vessel structure**, *Nuclear Engineering and Design*, Vol 346, pp. 140-156, https://doi.org/10.1016/j.nucengdes.2019.02.011

96. Saouma, V. and Hariri-Ardebili, M. (2019) **Shear Strength of AAR Affected Concrete**, *Under Preparation*

95. Hariri-Ardebili, M.A.. and Seyed-Kolbadi, S,M. and Saoumaa, V.E. and Salamon, J. and Rajagopalan, B. (2018) **Random Finite Element Method for the Seismic Analysis**

of Gravity Dams, Vol. 71, pp. 405-420
https://doi.org/10.1016/j.engstruct.2018.05.096

94. Liaudata,J. and Carol, I. and Lopez, C. and Saouma, V. (2018) **ASR Expansions in Concrete under Triaxial Confinement** *Cement and Concrete Composites*, Feb., pp 160-170
https://doi.org/10.1016/j.cemconcomp.2017.10.010

93. Saouma, V. and Hariri-Ardebili, and Merz, C. (2018) **Risk-Informed Condition Assessment of a Bridge with Alkali Aggregate Reaction**, *ACI Structures Journal*, Vol. 115, pp. 475-487.
http://dx.doi.org/10.14359/51701106

92. Hariri-Ardebili, M. and Saouma, V (2018) **Random Response Spectrum Analysis of Gravity Dam Classes: Simplified, Practical and Fast Approach**, *EERI Spectra*.
https://doi.org/10.1193/021517EQS033M

91. Hariri-Ardebili, M. and Saouma, V (2017) **Single and Multi-Hazard Capacity Functions for Concrete Dams**, *Soil Dynamics and Earthquake Engineering*, Vol. 101, pp 234–249
http://dx.doi.org/10.1016/j.soildyn.2017.07.009

90. Saouma, V. and Hariri-Ardebili, (2018) **Sensitivity and Uncertainty Analysis of AAR Affected Reinforced Concrete Shear Walls**, *Engineering Structures* V. 172, pp. 334-345.
https://doi.org/10.1016/j.engstruct.2018.05.115

89. Saouma, V. and Hariri-Ardebili, M. and Le Pape Y. and Balaji, R. (2016) **Effect of Alkali-Silica Reaction on the Shear Strength of Reinforced Concrete Structural Members. A Numerical and Statistical Study**, *Nuclear Engineering and Design*, Vol. 310, pp. 295-310.
http://dx.doi.org/10.1016/j.nucengdes.2016.10.012

88. Hariri-Ardebili, M. and Saouma, V. (2016) **Seismic Fragility Analysis of Concrete Dams; A State-of-the-Art Review**, *Engineering Structures*, Vol. 128, pp. 374-399
http://dx.doi.org/10.1016/j.engstruct.2016.09.034.

89. Na, O., and Xi, Y., and Ou, E. and Saouma, V. (2015) **The Effects of Alkali-Silica Reaction on Mechanical Properties of Concrete with Three Different Types of Reactive Aggregates**, *Structural Concrete* Vol. 17, pp. 74-83
http://doi:10.1002/suco.201400062.

88. Hariri-Ardebili, M. and Saouma, V. (2016) **Sensitivity and Uncertainty Quantification of the Cohesive Crack Model** *Engineering Fracture Mechanics*, Vol. 155, pp. 18-35
http://dx.doi.org/10.1016/j.engfracmech.2016.01.008

87. Hariri-Ardebili, M. and Saouma, V. (2016) **Probabilistic Seismic Demand Model and Intensity Measure for Concrete Dams**, *Journal of Structural Safety*, Vol. 59,

pp. 67-85
http://dx.doi.org/10.1016/j.strusafe.2015.12.001.

86. Hariri-Ardebili, M. and Furgani, L. and Maghella, M., and Saouma, V. (2016) **A new class of seismic damage and performance indices for arch dams via ETA method**, *Engineering Structures*, V. 110 pp. 145-160,
http://dx.doi.org/10.1016/j.engstruct.2015.11.021.

85. Hariri-Ardebili, M. and Saouma, V. and Porter, K. (2016) **Quantification of Seismic Potential Failure Modes in Concrete Dams**, *Earthquake Engineering and Structural Dynamic*, Vol. 45, pp. 979-997
http://dx.doi.org/10.1002/eqe.2697.

84. Hariri-Ardebili, M. and Saouma, V. (2016) **Collapse Fragility Curves for Concrete Dams; A Comprehensive Study**, *ASCE J. of Structural Engineering*, Vol. 142, No. 10
http://dx.doi.org/10.1061/(ASCE)ST.1943-541X.0001541.

83. Saouma, V.E. (2015) **Applications of Fracture Mechanics to Cementitious Materials; A Personal Perspective**, in *ACI SP-300 Fracture Mechanics Applications in Concrete*, G.L. Cusatis Editor

82. Saouma, V.E. and Martin, R. and Hariri-Ardebili, M. and Katayama, T.(2015) **A Mathematical Model for the Kinetics of the Alkali Silica Chemical Reaction**, *Cement and Concrete Research*, Vol. 68, pp. 184-195
http://dx.doi.org/10.1016/j.cemconres.2014.10.021.

81. Saouma, V. and Hariri-Ardebili, M. (2014) **A Proposed Aging Management Program for Alkali Silica Reactions in a Nuclear Power Plant** *Nuclear Engineering and Structural Design*, Vol 277, pp. 248-264.
http://dx.doi.org/10.1016/j.nucengdes.2014.06.012

80. Hariri-Ardebili, M., Saouma, V. (2015) **Quantitative Failure Metric for Gravity Dams** *Earthquake Engineering and Structural Dynamics*, Vol. 44, pages 461-480.
http://dx.doi.org/10.1002/eqe.2481.

79. Hariri, M. and Saouma, V. (2013) **Impact of Near-Fault vs. Far-Field Ground Motions on the Seismic Response of an Arch Dam with Respect to Foundation Type** *Dam Engineering*, Vol. XXIII, Issue 4, page 1-34

78. Saouma, V., Kang, D., Haussman, G. (2012), **A Computational Finite-Element Program for Hybrid Simulation**, *Earthquake Engineering and Structural Dynamic Journal*, Vol. 41, pp. 375-389.
http://dx.doi.org/10.1002/eqe.1134

77. Saouma, V., Haussmann, Kang, D.H, Ghannoum, W. (2014), **Real Time Hybrid Simulation of a Nonductile Reinforced Concrete Frame**, *ASCE Journal of Structural Engineering*, Vol. 140, No. 2, pp. 04013059-1 -12
http://dx.doi.org/10.1061/(ASCE)ST.1943-541X.0000813

76. Puatatsananon, W., Saouma, V.(2013) **Chemo-Mechanical Micro Model for Alkali-Silica Reaction** *ACI Materials Journal*, Vol. 110, No. 1, pp 67-78
http://dx.doi.org/10.14359/51684367

75. Saouma, V., Miura, F., Lebon, G. Yagome, Y. (2011), **3D Rock-Structure Interaction for Massive Concrete Structures**, *Bulletin of Earthquake Engineering*, pp. 1387–1402.
http://dx.doi.org/10.1007/s10518-011-9261-7

74. Ghannoum, W., Saouma, V., Haussmann, G., Polkinghorne, K. and Eck, M. (2012) **Experimental Investigations of Loading Rate Effects in Reinforced Concrete Columns**, *ASCE Journal of Structural Engineering*, Vol. 138, pp. 1032-1041.
http://dx.doi.org/10.1061/(ASCE)ST.1943-541X.0000540

73. Lebon, G., Saouma, V., Uchita, Y. (2010) **3D Rock-Dam Seismic Interaction**, *Dam Engineering*, pp., 101-130.

72. Tussiwand, S., Saouma, V., Terzenbach, R., De Luca, L.Y. (2009) **Fracture Mechanics of a Solid Rocket Motor Propellant Grains: Material Testing**, *AIAA Journal of Propulsion and Power*, Vo. 25, No. 1, pp. 60-73
https://doi.org/10.2514/1.34227

71. Puntel, E., Saouma, V. (2008), **Experimental Behavior of Concrete Joints Under Cyclic Loading**, *ASCE J. of Structural Engineering*, Vol. 134, No. 9, pp. 1558-1568.
http://dx.doi.org/10.1061/(ASCE)0733-9445(2008)134:9(1558)

70. Puatatsananon, W., Saouma, V., and Slowik, V., **Numerical Modeling of Heterogenous Material** *Computers and Concrete*, 2008, Vol. 5, No. 3.

69. Saouma, V., Perotti, L., Shimpo, T. **Stress Analysis of Concrete Structures Subjected to Alkali Aggregate Reactions**, *American Concrete Institute Structural Journal*, Vol. 104, No. 5, pp. 532-541, September-October, 2007.
http://dx.doi.org/10.14359/18855

68. Saouma, V. Perotti, L., **Constitutive Model for Alkali Aggregate Reactions**, *American Concrete Institute, Materials Journal*, Vol. 103, No. 3, pp. 194-202, May-June, 2006.
http://dx.doi.org/10.14359/15853

67. Puntel, E., Bolzon, G. Saouma, V., **A Fracture mechanics Based Model for Joints Under Cyclic Loading**, November 2006, *ASCE J. of Engineering Mechanics*, Vol. 132, No. 11, pp. 1151-1159.
http://dx.doi.org/10.1061/(ASCE)0733-9399(2006)132:11(1151)

66. Pham, H.B., Al-Mahaidi, R., Saouma, V., **Modelling of CFRP-Concrete Bond Using Smeared and Discrete Cracks**, *Journal of Composite Structures*, September 2006, Vol. 75, No. 1-4, pp. 145–150

65. Saouma, V., Fava, G., **On Fractals and Size Effects**, *International Journal of Fracture Mechanics; Special Issue Prof. Bažant's 70th Birthday*, Vol. 137, No. 1-4, pp. 231-249, Jan. 2006.
https://doi.org/10.1007/s10704-005-3060-6

64. Puatatsananon, W., Saouma, V., **Reliability Analysis in Fracture Mechanics Using the First Order Reliability Method and Monte-Carlo Simulation**, *Fatigue & Fracture of Engineering Materials and Structures*, Vol. 29, No. 11, pp. 959-975, Nov. 2006.

63. Saouma, V., Chang, S.Y., and Sbaizero, O., **Numerical Simulation of Thermal Residual Stress in Mo- and FeAl^{-}- Toughened Al_2O_3**, *Composites Part B: Engineering*, Vol. 37, pp. 550-555, 2006.

62. Uchita, Y., Noguchi, Y. and Saouma, V. **Seismic Dam Safety Research** *International Water Power & Dam Construction*, pp. 16-22, Dec. 2005.

61. Saouma, V.E., Uchita, Y., Gillan, C., Shimpo, T., **Centrifuge Tests of Concrete Gravity Dams Subjected to Hydrostatic and Uplift Forces**, *International Water Power & Dam Construction*, July 2005, pp. 38-41

60. Saouma, V.E. **Reliability Based Nonlinear Fracture Mechanics Analysis of a Dam**, *Dam Engineering* Vol. 16, No. 3, pp. 219-241, Nov. 2005.

59. Uchita, Y., Shimpo, T., Saouma, V., **Dynamic Centrifuge Tests of Concrete Dams**, *Earthquake Engineering and Structural Dynamics*, Vol. 34, pp. 1467-1487, Oct. 2005. http://dx.doi.org/10.1002/eqe.493

58. Puatatsananon, W. and Saouma, V., **Nonlinear Coupling of Carbonation and Chloride Diffusion in Concrete**, *ASCE J. of Materials Engineering*, May/June 2005, pp. 264-275.

57. Camata, G., Spacone, E., Al-Mahaidi, R. and Saouma, V., **Analysis of Test Specimens for Cohesive Near-Bond Failure of FRP-Plated Concrete**, *ASCE J. of Composites for Construction*, pp. 528-538 Vol. 8, No. 6, December 2004

56. Chandra, K. and Saouma, V., **Fracture of Rock-Concrete Interfaces: Laboratory Tests and Applications**, *ACI Structural Journal*, Vol. 101, No. 3, May-June 2004

55. ACI Committee 446 (Including Saouma), **Report on Dynamic Fracture of Concrete**, *American Concrete Institute* Report ACI 446.4R-04, 2004.

54. Hansen, E., Saouma, V. **3 D Nonlinear Finite Element/Fracture Mechanics Analysis of a Pressurized Nuclear Reactor Container Ring**, *Nuclear Engineering and Design*, Vo. 225, pp. 1–10, 2003

53. Hansen, E., Saouma, V.E. **Hybrid Models for 3D Analysis of Reinforced Concrete Structures**, *Revue Francaise de Genie Civil*, Vol. 7, No. 5, pp.647–658, 2003.

52. Saouma, V., Natekar, D. and Hansen, E., **Cohesive Stresses and Size Effects in Elasto-Plastic and Quasi-Brittle Materials**, *International Journal of Fracture*, Vol. 119, pp. 287–298, 2003.

51. Saouma, V., Hansen, E., Rypl, D., **3D Nonlinear Analysis of an Arch Dam**, *Dam Engineering*, Vol. XIV, Issue 1, June 2003.

50. Galvez, J.C., Cervenka, J., Cendon, D.A, Saouma, V. **A Discrete Crack Approach to Normal/Shear Cracking in Concrete**, *Cement and Concrete Research*, Vol. 32, pp. 1567-1585, 2002.
http://dx.doi.org/10.1016/S0008-8846(02)00825-6

49. Saouma, V. Natekar, D. and Sbaizero, O. **Nonlinear Finite Element Analysis and Size Effect Study of a Metal-Reinforced Ceramics-Composite**, *Materials Science and Engineering A*, A323, pp. 129-137, 2002.

48. Saouma, V.E. and Natekar,D., **Cohesive Stresses and Size Effect in Quasi-Brittle Material**, Sadhana, *Journal of the Indian Academy of Sciences*, Bangalore, Vol. 27, No. 126, Aug. 2002, pp. 461-466.

47. Denarié, E., Saouma, V., Iocco, A, and Varelas, D., **Concrete Fracture Process Zone Characterization with Fiber Optics**, *ASCE J. of Eng. Mechanics*, Vol. 127, No. 5, May 2001, pp. 494–502.

46. Slowik, V. and Saouma, V. **Water Pressures in Propagating Concrete Cracks**, *ASCE J. of Structural Division*, Vol. 126, No.2, pp. 235-242, Feb, 2000

45. Slowik, V. and Saouma, V. **Water Pressures in Propagating Concrete Cracks**, *ASCE J. of Structural Division*, Vol. 126, No.2, pp. 235-242, Feb, 2000

44. Hansen, E. and Saouma, V., **Numerical Simulation of Reinforced Concrete Deterioration; Part II: Steel Corrosion and Concrete Cracking**, *ACI Materials Journal*, Vol. 96, No. 3, pp. , 1999.

43. Hansen, E. and Saouma, V., **Numerical Simulation of Reinforced Concrete Deterioration; Part I: Chloride Diffusion**, *ACI Materials Journal*, Vol. 96, No. 2, pp. 173-180, 1999.

42. Slowik, V., Kishen, C. and Saouma, V., **Mixed Mode Fracture of Cementitious Bimaterial interfaces; Part I: Experimental Results**, *Engineering Fracture Mechanics*, Vol 60, No. 1, pp. 83-94, May 1998.

41. Červenka, J., Kishen, C. and Saouma, V., **Mixed Mode Fracture of Cementitious Bimaterial interfaces; Part II: Numerical Simulation**, *Engineering Fracture Mechanics*, Vol. 60, No. 1, pp. 95-107, May 1998.

40. Saouma, V. and Morris, D., **Application of Fracture Mechanics to Concrete Dams; A Detailed Case Study**, to *Dam Engineering*, Vol. IX, No. 4, pp. 321-344, 1998

39. Saouma, V. Anderson, D., Ostrander, K., Slowik, V., **Application of Fiber Braggg Gratings in Local and Remote Infrastructure Health Monitoring**, pp. 259–266, May 1998 *Materials and Structures; RILEM*,

38. Červenka, J. and Saouma, V., **Numerical Evaluation of 3D SIF for Arbitrary Finite Element Meshes**, *Engineering Fracture Mechanics*, Vol. 57, No. 5, July 1997, pp.541-563.

37. Shinmura, A. and Saouma, V. **Fluid Fracture Interaction in Pressurized Reinforced Concrete Structures**, *Materials and Structures; RILEM*, Vol 30, N0. 196, March 1997, pp. 72-80.

36. Saouma, V. and Morris, D., **Improving Concrete Dam Safety Evaluation: A Look at Recent Contributions**. *Hydro Review*, Vol. 16, No. 7, Dec. 1997, pp. 65-73

35. Slowik, V., and Saouma, V.E., **Large Scale Direct Tension Test of Concrete** *Cement and Concrete Research*, Vol. 26, No. 6, pp. 949-954, 1996.

34. Slowik, V., Plizzari, G., and Saouma, V.E., **Fracture of Concrete Under Variable Amplitude Fatigue Loading**, *ACI Materials Journal*, Vol. 93, No. 3, pp. 272-283, May-June 1996.

33. Saouma, V.E., Milner, D., **On Why Fracture Mechanics should be Used in Dam Safety Evaluation**, *Dam Engineering*, Vol 7, No. 3, pp. 215-231, Oct. 1996.

32. Brühwiler, E., and Saouma, V.E., **Water Fracture Interaction in Cracked Concrete; I Fracture Properties**, *ACI Materials Journal* Vol. 92, No. 3, pp. 296-303, 1995

31. Brühwiler, E., and Saouma, V.E., **Water Fracture Interaction in Cracked Concrete; II Hydrostatic Pressure in Cracks**, *ACI Materials Journal*. Vol. 92, No. 4, pp. 383-390, 1995

30. Brühwiler, E., and Saouma, V.E., **Water Fracture Interaction in Cracked Concrete; I Fracture Properties**, *ACI Materials Journal* Vol. 92, No. 3, pp. 296-303, 1995

29. Brühwiler, E., and Saouma, V.E., **Water Fracture Interaction in Cracked Concrete; II Hydrostatic Pressure in Cracks**, *ACI Materials Journal*. Vol. 92, No. 4, pp. 383-390, 1995

28. Plizzari, G., Waggoner, F. and Saouma, V., **Centrifuge Modeling and Analysis of Concrete Gravity Dams**, *ASCE Journal of Structural Engineering*, Vol. 121, No. 10, pp. 1471-1479, Oct. 1995.

27. Dewey, R., Reich, R., and Saouma, V.E., **Uplift Modelling for Fracture Mechanics Analysis of Concrete Gravity Dams**, *ASCE Journal of Structural Division*, Vol. 120, No. 10, pp. 3025-3044, Oct. 1994.

26. Reich, R., Saouma, V. and Chasten, C., **Mississipi River: Dam 27 by Pass Canal. Fracture Mechanics Based Analysis of a Gravity Lock Monolith**, *Int. J. of Dam Engineering*, Volume 5, No. 3, October 1994.

25. Saouma, V.E., and Barton, C., **Fractals, Fractures and Size Effects in Concrete**, *ASCE J. of Engineering Mechanics*, Vol. 120, No. 4, April 1994.

24. Waggoner, F., Plizzari, G. and Saouma, V., **Centrifuge Tests of Concrete Gravity Dams**, *Int. J. of Dam Engineering*, Vo. IV, No. 3, pp. 145-171, 1993.

23. Saouma, V.E., Broz, J., and Boggs, H.L., **Effect of Aggregate and Specimen Size on Fracture Properties of Dam Concrete**, *ASCE Journal of Materials in Civil Engineering*, Vol. 3, No. 3, pp. 204-218, Aug. 1991.

22. Broz, J., Saouma, V.E., Brühwiler, E., and Boggs, H., **Fracture Mechanics Experiments in a Centrifuge**, *Centrifuge-91*, pp. 575-582, Balkema, 1991.

21. Saouma, V.E., Broz, J., and Boggs, H.L., Brühwiler, E., **In-situ Field Testing for Fracture Properties of Dam Concrete**, *ASCE Journal of Materials in Civil Engineering*, Vol. 3, No. 3, pp. 219-234, Aug. 1991.

20. Brühwiler, E., Broz, J., and Saouma, V.E., **Fracture Model Evaluation of Dam Concrete**, *ASCE Journal of Materials in Civil Engineering*, Vol. 3, No. 4, pp. 235-251, Oct. 1991.

19. Ayari, M.L., and Saouma, V.E. **Static and Dynamic Contact/Impact Problems Using Fictitious Forces**, *International Journal for Numerical Methods in Engineering* Vol. 32, No. 3, pp. 623-644, Aug. 1991.

18. Dungar, R., Saouma, V., Whittman, F., **Conference Report: The Application of Fracture Mechanics to Dam Engineering** *Dam Engineering*, Vol 2, No. 1, pp. 3-20, 1991.

17. Saouma, V.E., Brühwiler, E., and Boggs, H.L., **A Review of Fracture Mechanics Applied to Concrete Dams**, *Int. J. of Dam Engineering*, Vol. 1, No. 1, pp. 41-57, Jan. 1990.

16. Ayari, M., and Saouma, V.E., **A Fracture Mechanics Based Seismic Analysis of Cracked Concrete Gravity Dams Using Discrete Cracks**, *Engineering Fracture Mechanics Journal*, Vol. 35, No. 1, 1990.

15. Saouma, V.E., Barton, C., and Gamal-El-Din, N., **Fractal Characterization of Fracture Surfaces in Concrete**, *Engineering Fracture Mechanics Journal*, Vol. 35, No. 1, 1990.

14. Sikiotis, E.S., Saouma, V.E., Long, M., and Roggers, W., **Finite Element Based Optimization of Complex Structures on a Cray/XMP Supercomputer**, *Computers and Structures*, Vol. 36, No. 5, pp. 901-911, 1990.

13. Saouma, V.E., Doshi, S., and Jones, M., **Architecture of an Expert System Based Code Checker**, *Int. J. for Engineering Applications of Artificial Intelligence*, Vol. 2, PP. 49-56, 1989.

12. Sikiotis, E.S., and Saouma, V.E., **Parallel Structural Optimization on a Network of Computer Workstations**, *Computers and Structures*, V. 29, No. 1, pp. 141-150, 1988.

11. Jones, M., and Saouma, V.E., **A Prototype Hybrid Expert System for Structural Design**, *ASCE J. of Computing*, V. 2, No. 2, pp. 136-143, 1988.

10. Sikiotis, E.S., and Saouma, V.E., **Optimum Design of Reinforced Concrete Frames Using Interactive Computer Graphics**, *Engineering with Computers*, V. 3, pp. 101-110, 1987.

9. Saouma, V.E. Ayari, M., and Leavell, D., **Mixed Mode Crack Propagation in Homogeneous Anisotropic Body**, *Engineering Fracture Mechanics*, Vol. 27, No. 2, pp. 171-184, 1987.

8. Saouma, V.E., and Sikiotis, E.S., **Stress Intensity Factors in Anisotropic Bodies Using Singular Isoparametric Elements**, *Engineering Fracture Mechanics*, Vol. 25, No. 1, pp. 115-121, 1986.

7. Saouma, V.E., and Sikiotis, E.S., **Interactive Graphics Nonlinear Constrained Optimization**, *Computer and Structures*, Vol. 21, No. 4, pp. 759-769, 1985.

6. Saouma, V.E., and Sikiotis, E.S., **Computer Graphics Aided Design of Reinforced Concrete Buildings**, *Concrete International*, Vol. 7, No. 6, pp. 25-30, June 1985.

5. Saouma, V.E., and Murad, R., **Partially Prestressed Concrete Beam Optimization**, *Journal of Structural Engineering, ASCE*, Vol, 110, ST3, pp. 589-604, 1984

4. Ingraffea, A.R., Gerstle, W.H. Gergely, P., and Saouma, V.E., **Fracture Mechanics of Bond in Reinforced Concrete**, *Journal of Structural Engineering, ASCE*, Vol. 110, ST4, pp. 871-890, 1984

3. Saouma, V.E., and Zatz, I.J., **An Automated Finite Element Procedure for Fatigue Crack Propagation Analysis**, *Engineering Fracture Mechanics*, Vol. 20, No. 2, pp. 321-333, 1984.

2. Saouma, V.E., and Schwemmer, D., **Numerical Evaluation of the Quarter Point Singular Element**, *International Journal of Numerical Methods in Engineering* Vol. 20, pp. 1629-1641, 1984.

1. Saouma, V.E., Ingraffea, A.R., and Catalano, D., **Fracture Toughness of Concrete; K_{ic} Revisited**, *Journal of the Engineering Mechanics Division, ASCE*, Vol. 108, No. EM6, pp. 1152-1166, 1982.

Major Conference Organizer

- 9th International Conference of the International Association of Fracture Mechanics of Concrete and Concrete Structures, IA-FraMCoS, Berkeley, CA, June 2016 (235 participants, 205 presentations, 32 countries) http://framcoss.org/FraMCoS-0.php

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Special Reviewed Publication

25. Hariri-Ardebili, M. and Saouma, V.(2019) **Long Term Assessment of Dams Suffering from Alkali Aggregate Reaction State of the Art Review**, Bureau of Reclamation report No. XX
24. Saouma, V. and Hariri-Ardebili, M. **Road Map for the Structural Assessment of Concrete Dams Suffering from ASR; Application to Seminoe Dam**, Bureau of Reclamation report No. XX
23. Saouma, V. (Editor) &, Fournier, B. and Katayama, T. and Leemann, A. and Lothenbach, B. and Martin, R.P. and Menéndez, E. and Sanchez, L. and Sellier, A. and Wood, J. **Diagnosis & Prognosis of AAR in Existing Structures** Technical Report to be Published by RILEM
22. Saouma, V., Spark, R. and Graff, D. (2017) **Design of an AAR Prone Concrete Mix for Large Scale Testing**, NRC Grant NRC-HQ-60-14-G-0010.
21. Saouma, V., Howard, D., Graff, D., and Hariri, M. (2017) **AAR Expansion; Effect of Reinforcement, Specimen Type, and Temperature**, NRC Grant NRC-HQ-60-14-G-0010.
20. Saouma, V., Graff, D., Howard, D. and Hariri, M. (2017) **Effect of AAR on Shear Strength of Panels**, NRC Grant NRC-HQ-60-14-G-0010.
19. Saouma, V. and Hariri, M.(2017) **Risk Based Assessment of the Effect of AAR on Shear Walls Strength**, NRC Grant NRC-HQ-60-14-G-0010.
18. Saouma, V. and Hariri, M. (2017) **Probabilistic Based Nonlinear Seismic Analysis of Nuclear Containment Vessel Structures with AAR**, NRC Grant NRC-HQ-60-14-G-0010.
17. Saouma, V. (2017) **Structural Modeling of Nuclear Containment Structures**, Special publication by Electric Power Research Institute (EPRI).
16. Hariri-Ardebili, M., Saouma, V., LePape, Y. (2016) **Independent Modelling of the Alkali-Silica Reaction: Mock-up Test Block**, Report ORNL/TM-2016/537
15. Saouma, V., Hariri-Ardebili, Puatatsananon, W., and Le Pape, Y. (2015) **. Preliminary Results on the Alkali-Silica Reaction in Massive Reinforced Concrete Structures: Numerical Simulations of Coupled Moisture Transport and Heat Transfer and Structural Significance of Internal Expansion**, ORNL/TM-2014/489
14. Saouma, V., Hariri-Ardebili, M., and Le Pape, Y. (2015) **Effect of Alkali-Silica Reaction on Shear Strength of Reinforced Concrete Structural Members**, ORNL/TM-2015/588.
13. Graves, H., Le Pape, Y., Naus, D., Rashid, J., Saouma, V., Sheikh, A., Wall, J. Expanded Material Degradation Assessment (EMDA), Volume 4: Aging of Concrete *Technical Report NUREG/CR7153, Vol. 4; ORNL/TM-2013/532.*
12. Saouma, V.E. and Sivaselvan, M.V. (Eds.) (2008) **Hybrid Simulation; Theory, Implementation and Applications**, Taylor & Francis.
11. Bourdarot, E., Mazars, J., and Saouma, V.E. (Eds.), **Fracture and Failure of Concrete Dams**, Balkema, 1994.
10. Reich, R. and Saouma, **Fracture Mechanics Analysis of Gravity Lock Monolith**, *Engineering Technical Letter, No. ETL 1110-2-344*, US Army Corps of Engineers Civil

Works, Engineering Division, Nov. 1992.

9. Plizzari, G., Saouma, V.E., and Waggoner, F., **Sperimentazione in Centrifuga di Dighe a Gravita in Calcestruzzo**, *Studi e Ricerche*, Vol. 13, Scuola di Specializzazione in Costruzioni in C.C., Fratelli Pesenti, Politecnico di Milano, pp. 359-394, 1992.
8. Saouma, V.E., and Brühwiler, E., **Engineering and Design Fracture Mechanics Analysis of Concrete Hydraulic Structures**, *Engineering Technical Letter, No. ETL 1110-2-8003*, US Army Corps of Engineers Civil Works, Engineering Division, Nov. 1991.
7. Saouma, V.E., Dungar, R., and Morris, D., (Eds.), **Proceedings of the International Conference on Dam Fracture**, GS-7491, Electric Power Research Institute, Palo-Alto, Sept. 1991.
6. Saouma, V.E., **Innovative Analysis and Design Procedures for Concrete and Arch Dams**, in *Jubillee Volume commemorating the retirement of Prof. L. Serafim*, Coimbra, Portugal, Oct. 1991.
5. Saouma, V.E., Ayari, M.L., and Boggs, **Static and Dynamic Fracture Mechanics of Concrete Dams**, in *Fracture Mechanics of Concrete Structures, From Theory to Applications*, L. Elfgren Editor, pp. 336-354, Chapman and Hall, 1989.
4. **Computer Application in Concrete Technology**, ACI, SP106, 1988.
3. Saouma, V.E., Ayari, M.L., and Boggs, H., **Fracture Mechanics of Concrete Gravity Dams**, in *Fracture of Concrete and Rock*, S. Swartz, and S. Shah Editors, pp. 311-333, Springer-Verlag, 1989, (Translated into Chinese).
2. Saouma, V.E., Sikiotis, E.S., **On the Optimization of Partially Prestressed Concrete Beams**, *in Partial Prestressing, From Theory to Practice* M.Z. Cohn, Ed., PP. 411-425, Martinus Nijohoff Publ., 1986.
1. Ingraffea, A.R., Saouma, V.E., **Numerical Modelling of Discrete Crack Propagation in Reinforced and Plain Concrete**, *in fracture Mechanics of Concrete, Structural Application and Numerical Calculation*, G.C. Sih, and A. de Tomaso, Editors, Martinus Nijhoff Publ., 1984.

Consulting Activities

1. Seoul National University; Structural Evaluation of Hanbit Nuclear Power Plant Number 4, S. Korea. (2020)
2. C-10 (*pro-bono*) in the matter of C-10 vs NextEra Energy Seabrook, LLC) Docket No. 50-443, ASLBP No. 17-953-02-LA-BD01. Wrote the emergency petition, multiple motions, direct and verbal testimony.
3. Pressurized cracks in concrete offshore structures, Shell Norway (through Reinertsen).
4. Review of Detensioning Plans for CR-3 (Progress Energy) through Structural Integrity.
5. Cracking of Crystal River nuclear reactor containment vessel (Progress Energy) through Performance Improvement International, San Diego.
6. Weidlinger & Assoc., New-York. Rebuttal report of a fracture mechanics based explanation for the fatal parking garage collapse at the Tropicana casino resort in Atlantic City, NJ.
7. Tokyo Electric Power Service Company, Tokyo, Japan.

8. New-York City Department of Environmental Protection (through Gannett Flemming), Gilboa Dam.
9. Cracking in solid rocket propellants, Bayern-Chemie GmbH, Aschau/Inn, Germany
10. Iran Water Power Company (Karun 4 dam), Tehran, Iran.
11. Edison Elletricita, Turin, Italy.
12. Electricité de France, Paris
13. Obayashi Corporation, Japan
14. Tokyo Electric Power Service Company, Japan
15. US Bureau of Reclamation
16. Hilti Corporation, Lichtenstein.
17. Schnabel Engineering, Denver, CO
18. Swiss Dam Safety Authority, Berne, Switzerland
19. ISMES, Bergamo, Italy
20. ESI, Paris, France
21. PCS Mining, Saskatoon, Canada.
22. ACS Martin, L. A., CA
23. Hanna Mining, Cleveland, OH
24. General Dynamics, Fort-Worth TX
25. TERRA-TEK INC., Salt-Lake City, UT
26. CTICM, Paris, France
27. Southern Utility Company
28. US Army Corps of Engineers

Funded Research

Principal Investigator			
Jan. 2018-Dec. 2020	Long Tern Assessment of Dams Suffering from Alkali Aggregate Reaction	US Bureau of Reclamation	$592,327
May. 16-Sept. 16.	Independent Modeling of the Alkali-Silica Reaction Mock-Up Test Block	Oak Ridge National Laboratory	$ 60,000
Oct. 14 - Sept. 17	Experimental and Numerical Investigation of Alkali-Silica Reactors	Nuclear Regulatory Commission	$ 703,197
May 16-Dec 16	Report on Numerical Modeling of Nuclear Structures	Electric Power Research Institute	$35,000
Jan. 15 - Aug. 15	Alkali-Silica Reaction in Nuclear Power Plants	Oak Ridge National Laboratory	$ 36,000
Jan. 14 - Jan. 14	Alkali-Silica Reaction in Nuclear Power Plants	Oak Ridge National Laboratory	$ 138,000
Oct 12 - Dec 12	Developing Corporate Performance-Based Seismic Design Guideline Works	Enerjisa, Turkey	$48,500

Oct. 09 - Dec. 10	Unconventional Fracture Tests for Crystal River Project	Progress Energy	$130,000
Oct. 08- Nov. 09	Development of Finite Element Code Mercury	NEESinc	$120,000
Jul. 08 - Mar. 10	3D Nonlinear Dynamic Analysis of Dams; Software Development and Technical Support.	Tokyo Electric Power Service Company	$1,000,000
Jul. 07 - Mar. 10	AAR Expansion in Concrete under Triaxial Confinement.	Tokyo Electric Power Service Company	$120,000
September 07	NEESinc	Workshop Organization at CU-NEES	$7,500
Jul. 06 - Mar. 07	AAR Expansion in Concrete under Triaxial Confinement.	Tokyo Electric Power Service Company	$64,000
Jul. 06 - Mar. 07	Life Prediction of AAR Affected Structures	Tokyo Electric Power Service Company	$20,000
Jul. 06 - Mar. 07	3D Nonlinear Dynamic Analysis of Dams; Software Development and Technical Support.	Tokyo Electric Power Service Company	$150,000
Jul. 06	Integration of Fast Hybrid Testing with a Cluster of 124 CPU	University of Colorado (Prof. Cai, Co-Pi)	$28,000
Jan. 06- Sep. 09	Operation and Maintenance of the Colorado NEES Site	National Science Foundation	$949,063
Nov. 05 - Mar. 06	Nonlinear Fracture Mechanics of Solid Rocket Propellant	Bayern-Chemie GmbH, Aschau/Inn, Germany	–
Jun. 05 - Mar. 06	Nonlinear Simulation of an AAR Affected High Voltage Transmission Tower	Tokyo Electric Power Service Company	$20,000
Dec-04 - Mar. 05	Numerical Simulation AAR Deterioration in a High Voltage Transmission Tower	Tokyo Electric Power Service Company	$ 10,000
Jan. 03 - Dec. 04	Cyclic Response of Concrete Joints	Italian Ministry of Research	38,000 Euro
Mar. 02 - Dec.02	Generation of a 3D Finite Element Mesh for a Nuclear Reactor Panel	Electricité de France	10,000 Euro
Jan-02- Dec-04	Numerical Investigation of Alkali-Aggregate Reactions in Dams	FOWG, Switzerland	CHF 100,000
Aug. 02 - Mar. 07	Static and Dynamic Dam Safety Investigation Using Fracture Mechanics	Tokyo Electric Power Service Company	$ 891,599
Aug. 00 - Jul. 02	Static and Dynamic Dam Safety Investigation Using Fracture Mechanics	Tokyo Electric Power Service Company	$ 635,423
Jun. 00 - May 02	Deterioration of Reinforced Concrete; A Fracture Mechanics Approach	National Science Foundation	$ 128,000
Jan.94 - Aug. 94	Mixed Mode Testing of Rock/Concrete Interfaces	Electric Power Research institute	$ 57,000

Aug. 93 - Jul. 94	Development of Instructional Workbenches for Small Scale Structural Testing	Univ. of Colorado	$ 20,000
Jan. 93 - Dec. 93	Large Scale Mixed Mode Testing of Rock/Concrete Interfaces	Electric Power Research Institute	$ 171,312
Jan. 90 - Dec. 91	Uplift Pressure in Dam Cracks under Seismic Loading, and 3D Fracture Analysis of Concrete Gravity Dams	Electric Power Research Institute, and Pacific Gas and Electric	$ 150,000
Jun. 89 - May 92	Fracture Mechanics of Concrete Dams: Part II From Theory to Applications; Static Case.	Electric Power Research Institute	$ 592,000
May 89 - Aug. 90	Effect of Uplift Pressure on Fracture Characterization of Concrete: Design and Evaluation of Testing Procedure	Electric Power Research Institute	$ 41,857
Jul. 88	Donation of two Apollo DN3500 workstations	Apollo Computer	$ 54,000.
Feb. 88 - Jan. 89	Design and Checking Automation of Reinforced Concrete Structures	U.S. Army Corps of Engineers	$ 60,037.
Feb. 88 - Jan. 89	Load Module Development for 3DSAD	U.S. Army Corps of Engineers	$ 42,493.
Dec. 87 - Feb. 88	Integrated Computer Aided Design of Complex Structures	General Dynamics, Advanced Analysis Group	$ 21,000.
Dec. 87 - Jun. 88	Implementation of a Distributed Finite Element Based Structural Optimization Program on a CRAY/XMP	Cray Research	Computer and Technical Support
Jun. 87 - Nov. 88	Fracture Mechanics of Concrete Dams	Electric Power Research Institute	$ 131,809
Dec. 86 - Sep. 87	Elasto-Plastic Fracture Mechanics of Welded Plates	National Bureau of Standards	$ 9,594.
Sep. 86 - Jun. 87	Instructional Expert System for ACI Code Provisions	University of Colorado	$ 3,998.
Sep. 86 - Aug. 87	Expert System Development for R/C Beam Design Checking; Part I.	U.S. Army Corps of Engineers	$ 99,820.
Aug. 86 - Dec. 86	Finite Element Simulation of Rock Hydrofracture near a Subsurface Cavity	U.S. Army Corps of Engineers	$ 7,200.
Sep. 85 - Aug 86	Engineering Research Equipment Grant: Network of High Performance " Computational Workstations" (Co P.I. K. Willam. C. Gustafson) Matching Fund	National Science Foundation University of Colorado	$ 76,400. $ 50,000.

Feb. 86 - Sep. 86	An Automated Model for the Load Definition Module of the 3DSAC CDAMS Program	U.S. Army Corps of Engineers	$ 13,000.
Oct. 85 - Sep. 86	Implementation of an Integrated Fatigue Life Prediction Program on a Cray	General Dynamics, Fort-Worth, TX	$ 47,000.
Sep. 85 - May 86	Application of Artificial Intelligence to Reinforced Concrete Design	CRCW, Univ. of Colorado	$ 2,500.
Sep. 85 - Aug. 86	Fracture Mechanics of Concrete Dams	Bureau of Reclamation	$ 9,995.
Aug. 85 - Dec. 85	Numerical and Experimental Studies on Bitt Cutter Performance	PCS Mining, Saskatchewan	$ 17,000.
Oct. 83 - Nov. 85	Partially Prestressed Concrete Beam Optimization	National Science Foundation; Research Initiation Grant	$ 47,967.

Co-Principal Investigator			
Apr 89 - Mar 91	Brittle-Ductile Failure Mechanics of Mortar and Concrete (Co P.I. K. Willam & S. Sture)	US-AFOSR	$ 137,971.
	Personal Contribution 33.3%		$45,990
Jul. 88 - Jan. 91	Load Prediction and Structural Response of Bridges (Co-P.I. G. Goble, D. Frangopol, J. Dow)	Federal Highway Agency	$ 800,000.
	Personal Contribution 10%		$80,000
Jun. 88 - May 89	Simulation of Progressive Failure in Solids and Structures (Co-P.I. K. Willam, S. Sture)	National Science Foundation	$ 191,000.
	Matching Fund	University of Colorado	$ 15,000.
	Personal Contribution 25%		$51,500
Oct. 87 - Sep. 89	Simple Load Capacity Tests for Bridges to Determine Load Posting Levels (Co P.I. G. Goble, D. Frangopol)	Pennsylvania Department of Transportation	$ 220,572.
	Personal Contribution 33%		$72,788
Aug. 87 - Jul. 88	Brittle-Ductile Failure Mechanics of Mortar and Concrete (Co P.I. K. Willam & S. Sture)	US-AFOSR	$ 50,000.
	Personal Contribution 15%		$7,500

Wrote final proposal for the establishment of the **Bechtel Computer Aided Design Laboratory**, $1,000,000.

Short Courses

1. Fracture Mechanics; University of Rome (Roma 3), July 2011
2. Fracture Mechanics; Polytechnic University of Catalunya, Summer 2010.
3. Short course on AAR, Paris, October 2009.
4. Workshop on Dam Research Needs, Boulder Sept. 2007
5. Workshop on Fast Hybrid Simulation, Boulder Aug. 2007
6. Alkali Aggregate Reactions in Massive Concrete Structures; Boulder, CO, April 2007
7. Workshop on Fast Hybrid Simulation, Boulder Nov. 2006
8. Alkali Aggregate Reactions in Massive Concrete Structures; Boulder, CO, April 2005
9. Alkali Aggregate Reactions; and Dynamic Analysis of Dams;International Center for Structure mechanics (CISM), Udine, December 2004.
10. Nonlinear Dynamics of Concrete Dams, 4 hours in a Course at the Politecnico of Milan on Nonlinear Dynamic Analysis of Structures, July 2004.
11. *Recent Advances in Engineering for Concrete Dams*, with Dungar, R., and Boggs, H.; 58 Participants from 14 countries, Sept. 9-10 1991 Boulder CO.

Invited Papers

18. Saouma V. and Hariri, M. (2018) **Probabilistic Cracking, Ageing and Shaking of Concrete Dams**, International Symposium on Dam Safety, Istanbul Turkey.
17. Saouma, V. (2016) **Size Effect: From Irwin to Bažant and Mandelbrot**, invited paper to the first Bažant Workshop at the 9th triennial Conference organized by the International Association for Fracture of Concrete and Concrete Structures, Berkeley, June 2016.
16. Saouma, V. (2013) **Application of the Cohesive Crack Models to Concrete, Ceramics and Polymers** Keynote Lecture at the 8th triennial Conference organized by the International Association for Fracture of Concrete and Concrete Structures, Toledo, April 2013.
15. Saouma, V. and Puatatsananon, W. **Chemo-Mechanical Model for Alkali-Silica Reaction**, 1st International Conference on Numerical Modeling Strategies for Sustainable Concrete, Aix-en-Provence, May 2012.
14. Saouma, V., Uchita, Y., Yagome, Y. **Research needs in Seismic Safety of Dams**, *Proceedings of the 4th US-Japan Workshop on Advanced Research on Dams*, Technical Memorandum No. 4075, Public Works Research Institute, Tsukuba, Japan, pp. 279–293 May, 2007.
13. Saouma, V. **Advanced Joint Modelling**, in *NW-IALAD, European network on Dam Engineering*, Barcelona, November, 2004.
12. Saouma, V. **Nonlinear Dynamics of Concrete Joints; from Theory to Dam Applications**, in *NW-IALAD, European network on Dam Engineering*, Zurich, Sept. 2004.
11. Saouma, V. and Chang, S.Y., **Numerical Simulation of Reinforced Concrete Deterioration due to Steel Corrosion, Freezing-Thawing and Mechanical Load Effects** in *Life-Cycle Performance of Deteriorating Structures: Assessment, Design and Management*, Special Publication of ASCE, Eds., D.M. Frangopol, E. Bruhwiler, M.H. Faber, and B. Adey, 2003
10. Saouma, V.E. and Uchita, T., **3D Nonlinear Dynamic Analysis of Concrete Dams**, *ICANCEER International Conference on Advances and New Challenges in Earthquake Engineering Research*, Harbin, PRC, Aug. 2002
9. Saouma, V.E., **Numerical Simulation of Concrete Deterioration**, *NSF Workshop*, Prague, July 2002
8. Saouma V. E., Červenka J., **Finite Element Analysis of R/C Strucutres A Hybrid Approach**, *US Japan Seminar on Post-Peak Behavior of Reinforced Concrete Structures Subjected to Seismic Loads* Lake Yamanaka, Oct. 25-29, 1999.
7. Saouma V. E., Červenka J., Slowik V., & Chandra Kishen J. M., **Mixed mode fracture of rock-concrete interfaces**, *US-Europe Workshop on Fracture and Damage of Quasi-Brittle Materials: Experiment, Modeling and Computer Analysi*, Prague, Czech Republic, Sep. 21-23, 1994.
6. Saouma, V.E., **Fracture Mechanics of Concrete Dams**, Keynote Speaker at the *Fracture Mechanics for Hydroelectric Power Systems Symposium*, Vancouver, September

1994.

5. Saouma, V.E., **Size Effects and Fractal Analysis of Concrete; Byproducts of a Dam Fracture Research Project**; *Int. Conference on Size Effect* Sendai Japan, Nov. 1993.
4. Reich, R., Červenka, J., Plizzari, G., and Saouma, V., **Implementation and Validation of a Nonlinear Fracture Model in a 2D/3D Finite Element Code**, *First Bolomey Workshop*, ETH, Zurich, July 1992.
3. Saouma, V., Červenka, J., Keating, S., Reich, R., and Waggoner, F., **Fracture Mechanics of Concrete Dams**, *Int. Conference on Fracture Mechanics of Concrete Structures*, Breckenridge, CO, June 1992.
2. Saouma, V.E., Reich, R., **Fracture Mechanics Analysis of Lock and Dam 27**, *US Army Corps of Engineers Structures Conference*, Jacksonville, July 1991.
1. Saouma, V.E., Ayari, M., and Boggs, H., **Fracture Mechanics of Concrete Gravity Dams**, *Fracture of Dams*, Session, International Conference on Fracture of Concrete and Rock, Houston, June 1987, Springer-Verlag, pp.311-333.

Refereed Conference Proceedings

50. Y. Le Pape, V. Saouma, Z. J. Ma, J. V. Cabage, M. Guimaraes, K.G. Field, C.H. Mattus, D.J. Naus, J.T. Busby, **Significance of Alkali-Silica Reaction in Nuclear Safety-Related Concrete Structures**, Fontevraud 8 - Contribution of Materials Investigations and Operating Experience to LWRs' Safety, Performance and Reliability France, Avignon - 2014, September 14-18
49. Puntel, E. and Saouma, V. **Experimental Behaviour of Concrete Joint Interfaces Under Reversed Cyclic Loading**, in *Analytical Models and New Concepts in Concrete and Masonry Structures*, AMCM'2008, Lodz, Poland, June 2008.
48. Uruchida, S., Yagome, Y., Kubota, K., Uchita, Y., Saouma, V., **Experimental Investigation of Dynamic Uplift in Concrete Gravity Dams**, rm ICOLD Annual Meeting Symposium, St Petersburg, June 2007
47. Al-Mahaidi, R., Pham, H.B., Saouma, V., **Discrete-Smeared Crack Finite Element Mechanisms in RC Members**, 8th International Symposium on Fiber Reinforced Polymer Reinforcement for Concrete Structures, FRPRCS-8, Patras, July 2006
46. Pham, H.B., Al-Mahaidi, R., Saouma, V., **Modelling of CFRP-Concrete Bond Using Smeared and Discrete Cracks**, International Symposium on Bond Behaviour of FRP in Structures (BBFS 2005), Chen and Teng (eds.), 2005
45. Saouma, V., Perotti, L. **Alkali Aggregate Reactions in Dams; Stress Analysis and Long Term Predictions**, American State Dam Safety Official (ASDSO) Conference on Dam Safety, New Orleans, Sept. 2005.
44. Uruchida, S., Shimpo, T., Uchita, Y., Yagome, Y., Saouma, V. **Dynamic Centrifuge Analysis of Concrete Gravity Dam**, 73^{rd} Annual Meeting of ICOLD, Teheran, IRAN, paper No. 085-04, 2005
43. Puntel, E., Bolzon, G., Saouma, V., **Numerical and Experimental Investigation of Joints Subjected to Cyclic Loading**, International Conference on Fracture Mechanics,

Torino, page 396, March 2005.

42. de Sanctis, F., Saouma, V. Viggiani, G. and Denarie, E. **Fracture Mechanics Characterization of Fine-Grained Tuff** EURO-Conference on Rock Physics and Geomechanics, Postdam, 20-23 Sept. 2004.
41. Noguchi, H., and Saouma, V., **An Investigation of Freeze-Thaw in Dam Concrete; Experimental and Numerical Study**, in Proceedings of Concrete Under Severe Conditions, Oh, B.H. Editor, Korea Concrete Institute, pp. 506-513, 2004
40. Camata G., Spacone E. and Saouma V., **Nonlinear modeling of debonding failure of RC structural members srengthened with FRP laminates**, Proceedings of 6th International Symposium on Fibre-Reinforced Polymer (FRP) Reinforcement for Concrete Structures (FRPRCS-6), Singapore, July, 2003.
39. Camata G., Spacone E. and Saouma V., **Modeling FRP strengthened reinforced concrete structural members using nonlinear finite elements**, fib-Symposium Concrete Structures in Seismic Regions, May 6-9, Athens, 2003.
38. Camata G., Spacone E. and Saouma V., **Nonlinear Fracture mechanics analysis of brittle failure modes of post-strengthening aged/damaged Reinforced Concrete structural members with Fiber Reinforced Polymer materials**, proceedings of Bond in Concrete - from research to standards, Budapest, November 2002.
37. Hansen E.J. and Saouma, V.E., **Numerical Simulation of Reinforced Concrete Deterioration**, *FRAMCOS-3 Proceedings*, pp 1655-1668, Mihashi and Rokugo Eds., AEDIFICATIO publishers, 1998.
36. Shinmura, A. and Saouma, V.E., **The Study of Water Leakage Through Fracture in Reinforced Concrete**, *FRAMCOS-3 Proceedings*, pp 1677-1686, Mihashi and Rokugo Eds., AEDIFICATIO publishers, 1998.
35. Plizzari, G., Saouma, V.E, and Slowik, V., **Comportamento del Calcestruzzo Fessurato in Presenza di Carichi Ciclici di Ampiezza Variabile**, Gruppo Italiano Frattura, (IGF 11), pp. 297-306, Brescia, 1995.
34. Slowik, F., Kishen, C., Saouma, V., and Morris, D., **Rock/Concrete Cracks; Myths and Realities**, WaterPower 1995, San-Francisco, July 1995.
33. Červenka, J., Saouma, V. and Morris, D., **MERLIN: a 2D/3D Finite Element Program for Safety Assessment of Cracked Dams**, WaterPower 1995, San-Francisco, July 1995.
32. Plizzari, G., and Saouma, V., **Linear or Nonlinear Fracture Mechanics of Concrete?** Proceedings of the 2nd International Conference on Fracture Mechanics for Concrete and Concrete Structures (FraMCoS2), Wittmann, F.H. (Ed.), Zurich, July 1995.
31. Slowik, F. and Saouma, V., **Transient Fluid Fracture Interaction**, Proceedings of the 2nd International Conference on Fracture Mechanics for Concrete and Concrete Structures (FraMCoS2), Wittmann, F.H. (Ed.), Zurich, July 1995.
30. Červenka, J., and Saouma, V., **Discrete Crack Modeling in Concrete Structures**, Proceedings of the 2nd International Conference on Fracture Mechanics for Concrete and Concrete Structures (FraMCoS2), Wittmann, F.H. (Ed.), Zurich, July 1995.
29. Červenka, J., Boggs, H., Plizzari, G., and Saouma, V., **Non-Linear Analysis of Joint Behavior Under Thermal and Hydrostatic Loads for an Arch Dam**, *Third Benchmark Workshop on Numerical Analysis of Dams*, ICOLD, Paris, Spetember, 1994, Vol 1,

pp. 255-277.

28. Červenka, J., Boggs, H., Plizzari, G., and Saouma, V., **Evaluation of Critical Uniform Temperature Decrease of a Cracked Buttress Dam**. *Third Benchmark Workshop on Numerical Analysis of Dams*, ICOLD, Paris, Spetember, 1994, Vol 2, pp. 467-485.
27. Reich, R., Červenka, J., and Saouma, V., **MERLIN: A Computational Environment for 2D/3D Discrete Fracture Analysis**, Proceedings of the EURO-C 1994 Conference on Computational Modelling of Concrete Structures, 1994.
26. Slowik, V., and Saouma, V., **Investigation on Cracking of Concrete with Applications to the Seismic Safety of Dams**, Proceedings of the EURO-C 1994 Conference on Computational Modeling of Concrete Structures, 1994.
25. Saouma, V.E., Boggs, H., and Morris, D., **Safety Assessment of Concrete Dams Using Fracture Mechanics**, Q.68, R.84, Proceedings of the 18th ICOLD (International Commission on Large Dam) Conference, pp. 1415-1435, Durban 1994.
24. Perrone, C., Songer, A.D., and Saouma, V., **A Hypermedia-Based Framework for an Integrated Civil Engineering Curriculum**, American Society of Engineering Education, Gulf-Southwest Annual Meeting, Austin, TX, 1993
23. Songer, A.D., Perrone, C., and Saouma, V., **aHyper CE: Computer Aided Instruction for the Introduction to Civil and Architectural Engineering**, American Society of Engineering Education, Gulf-Southwest Annual Meeting, Austin, TX, 1993
22. Saouma, V., Červenka, J., Keating, S., Reich, R., and Waggoner, F., **Fracture Mechanics of Concrete Dams**, Proceedings of the Int. Conference on Fracture Mechanics of Concrete Structures, Elsevier Applied Science, pp. 404-412, 1992.
21. Reich, J., Cervenka, J., and Saouma, V., **Computational Fracture Mechanics of Concrete**, ASCE Specialty Conference in Computational Mechanics, Texas, 1992.
20. Reich, R., Cervenka, and Saouma, V.E., **Numerical Techniques for 2D and 3D Nonlinear Fracture Mechanics Based Analysis of Dams**, Proceedings of the Int. Conf. on Dam Fracture, pp. 163-182, Boulder CO. Published by Electric Power Research Institute, GS-7491, Palo-Alto, Sept. 1991.
19. Saouma, V.E., Brühwiler, E., Keating, S., Ryan, J., and Schulz, J., **Innovative Fracture Testing Techniques for Dam Engineering**, Proceedings of the Int. Conf. on Dam Fracture, pp. 459-475, Boulder CO. Published by Electric Power Research Institute, GS-7491, Palo-Alto, Sept. 1991.
18. Brühwiler, E., and Saouma, V.E., **Water Fracture Interaction in Cracked Concrete Dams**, Proceedings of the Int. Conf. on Dam Fracture, pp. 551-567, Boulder CO. Published by Electric Power Research Institute, GS-7491, Palo-Alto, Sept. 1991.
17. Saouma, V.E., Brühwiler, E., Boggs, H., and Morris, D., **A Comprehensive Investigation of Fracture Mechanics of Concrete Dams**, Workshop on Application of Fracture Mechanics to Dam Engineering, Locarno, Sept. 17-18, 1990
16. Brühwiler, E., and Saouma, V.E., **Fracture Testing of Rock by the Wedge Splitting Test**, Proceedings of the 31st US Rock Mechanics Symposium, June 1990, Golden CO, pp. 287-294
15. Saouma, V., Dambowy, J., and Commander, B., **Automated Design of R/C Structures from Graphics to Expert Systems**, Proceedings of the second *Int. Conference on Computer Aided Analysis and Design of Concrete Structures*, pp. 479-489, Zell-Am-

See, Pineridge Press, Vol. 1, N. Bicanic and H. Mang Ed.

14. Saouma,V.E., Broz, J.J., Boggs, H.L., and Brühwiler, E. **A Comprehensive Investigation of Fracture Mechanics of Concrete Dams**, *International Symposium on Analytical Evaluation of Dam Related Safety Problems, Theme A: Concrete Dams-Fracture Problems*, ICOLD 57th Executive Meeting, Copenhagen, July 1989.
13. Saouma, V.E., Doshi, S., Jones, M.S., Sikiotis, E.S., **Research in Computer Aided Design of Reinforced Concrete at the University of Colorado**, *Proceedings of the ACI Symposium on Usage of Computers*, San Antonio, 1987.
12. Saouma, V.E., Droz, P., **Mixed Mode Blunt Crack Instability Using a Path Independent Contour Integral**, *Proceedings of the 8th Int. Conf. on Structural Mechanics in Reactor Technology*, Brussels, Aug. 1985.
11. Saouma, V.E., **Computer Graphics Aided Simulation of Crack Propagation**, *Proceedings of the XIII International Finite Element Congress*, Baden Baden, W. Germany, Nov. 19-20, 1984.
10. Saouma, V.E., and Sikiotis, E.S., **Interactive Computer Graphics in the Design of Reinforced Concrete Buildings**, *Proceedings of the Int. Conf. on Computer Aided Analysis and Design of Concrete Structures*, pp. 937-950, Pineridge Press, 1984.
9. Saouma, V.E., Jones, M.S., Jones, R.A., **CAI of Structural Analysis and CAE Laboratory Development**, *Proceedings of the National Conference on University Programs in Computer Aided Engineering, Design, and Manufacturing*, Lehigh University, 1984, pp. 179-185.
8. Saouma, V.E., and Sikiotis, E.S., **Application of Partial Prestressing Optimization**, *NATO/ARW Partial Prestressing: From Theory to Practice*, M.Z. Cohn, Editor, Paris 1984.
7. Saouma, V.E., and Sikiotis, E.S., **Interactive Graphics Nonlinear Constrained Optimization**, *NASA CP 2335, Research in Structures and Dynamics*, 1984, pp. 143-157.
6. Saouma, V.E., and Kleinosky, M.J., **Finite Element Simulation of Rock Cutting: a Fracture Mechanics Approach**, *Proceedings of the 25th U.S. Symposium on Rock Mechanics*, Northwestern University, Evanston IL, June 1984, pp. 792-799.
5. Saouma, V.E., **Computer Graphics Simulation of Crack Propagation**, *Proceedings of the Third International Conference on Numerical Methods in Fracture Mechanics*, Swansea, U.K., pp. 219-233, March, 1984, Pineridge Press.
4. Saouma, V.E., and Zatz, I.J., **An Automated Finite Element Procedure for Fatigue Crack Propagation Analyses**, *paper No. AIAA 83-0841, Proc. of the 24th AIAA/ASME/ASCE/AHSSDM Conference*, Lake Tahoe, Nevada, June 1983, pp. 196-204.
3. Saouma, V.E., and Ingraffea, A.R., **Discrete Crack Modelling in Reinforced Concrete**, *Proc. of the Engineering mechanics Specialty Conference*, ASCE, Purdue University, June 1983, pp. 1005-1008.
2. Saouma, V.E., and Hoelzeman, R. **Computer Graphics Aided Instruction of Structure**, *Proc. of the Eighth Conference on Electronic Computation*, Houston, Texas, Feb. 1983, pp. 209-222.
1. Saouma, V.E., and Ingraffea, A.R., **Fracture Mechanics Analysis of Discrete Cracking**, *Proc. of the IABSE Colloquium on Advanced Mechanics of Reinforced Concrete*,

Delft, 1981.

Lectures, Conference Presentations

96. Risk & Reliability Assessment of NCVS Subjected to AAR & Seismic Excitation; A Holistic Approach. Nuclear Regulatory Commission. Oct. 2017.
95. Aging and Shaking of Nuclear Containment Structures; Advanced Modelling. University of Grenoble/EdF Nov. 2017
94. Numerical Modeling of Alkali Silica Reaction, National Institute of Standards and Technology, Gaithesburg, April, 2015.
93. Ageing, Shaking and Cracking of Concrete Infrastructures, Swiss Federal Institute of technology, Lausanne, March 2015.
92. On Alkali Aggregate Reactions in Nuclear Power Plants, Nuclear Regulatory Commission, June, 2014.
91. Real Time Hybrid Simulation; Do we Still Need Shake table Tests; Universite de Grenoble, June 2014
90. Real Time Hybrid Simulation; Do we Still Need Shake table Tests; ETH Zurich, June 2014
89. Modeling of Alkali Silica Reaction; Oak Ridge National Laboratory, September 2013.
88. Nonlinear Analysis of Concrete Dams, Universidad de los Andes, Bogota Colombia. May 2013
87. Real Time Hybrid Simulation, Universidad de los Andes, Bogota Colombia. May 2013
86. Potential Applications of Real Time Hybrid Simulation in Aerospace Industry, presentation at Dassault Systemes, Paris, France, 2012
85. Potential Applications of Real Time Hybrid Simulation to *Electricite de France*, Cachan, May 2012
84. Aging, Shaking, and Cracking of Infrastructures: Dams and Nuclear Containment Vessels. Swiss Federal Institute of Technology, Lausanne, Nov. 2011.
83. On Nonlinear Analysis of Nuclear Reactor Containment Vessels; Food for Thought. Nuclear Regulatory Commission, October 2011.
82. Numerical Simulation of Alkali Aggregate Reaction in Nuclear Power Plants, Nuclear Regulatory Commission, October 2011.
81. Real Time Hybrid Simulation, Workshop on Adaptive Discretization and Applications, Roma 3, Italy, June 2011
80. Nonlinear Analysis of Dams, Special Seminar in Roma 3, Italy, June 2011
79. Dynamic Analysis of Reinforced and Massive Concrete Structures; Universita Federico II, Naples, Italy, May 2011
78. Real Time Hybrid Simulation vs Shake Table Tests, UCLA, Jan. 2011.
77. Real Time Hybrid Simulation vs Shake Table Tests, University of Washington, April 2011.
76. Real Time Hybrid Simulation in Reinforced Concrete; *Mécanique de l'Endomagement Appliquée au béton et aux structures en béton; Workshop en l'honneur de Jacky Mazars*, June 2010.

75. Real Time Hybrid Simulation vs. Shake Table Test' National Institute of Standards and Testing (NIST), Nov. 2010.
74. Nonlinear Dynamic Modeling of Concrete dams, XXXIV Jornadas Sudamericana de Ingenieria Estructural, San Juan, Argentina, Sept. 2010.
73. Cracking of Concrete; From Material Characterization to Structural Analysis; Oak Ridge National Laboratory; 1st Annual Coordinated Nuclear Materials Research Meeting; July 2010.
72. Nonlinear Analysis of Concrete Dams, Vattenfall, Sweden, May 2009.
71. Hybrid Simulation of reinforced Concrete Structures, University of Toulouse, May 2009
70. Nonlinear analysis of concrete Dams, Univesity of Roma (3), March 2009.
69. Numerical Modelling of alkali-Aggregate Reactions, University of Toulouse, March 2009.
68. CU-NEES Fast Hybrid Testing Facility, 6th NEES Annual Meeting in Portland, June 2008.
67. Concrete Dams; Aging, Cracking and Shaking. Delft Technical University, May 2008
66. Hybrid Simulation Research at CU-NEES, presented at the French Atomic Energy Commission, Saclay, France 2007
65. Modelling AAR with Merlin, ICOLD Workshop on Chemical Expansion in Concrete, Granada, 2007
64. Modeling of Alkali-Aggregate Reactions in Concrete, Swiss Federal Institute of Technology, Lausanne, July 2007.
63. Hybrid Testing at CU-NEES, LMS Corporation, Louvin, Belgium, July 2006.
62. Hybrid Testing Perspective, Central Research Institute of the Power Industry (CRIEPI), Abiko, Japan June 2006.
61. Seismic Analysis of Concrete Dams, Shimizu Laboratory, Tokyo, June 2006
60. Discrete Crack Models in Fracture Mechanics, Ecole des Mines, Sophia-Antepolis, France, July 2005.
59. 3D Nonlinear Dynamics Analysis of Concrete Dams. EPFL, Lausanne, March 2005.
58. Alkali Aggregate Reactions in Concrete Dams, US Bureau of Reclamation, March 2005
57. Nonlinear Finite Element Modeling of CFRP; *SIKA Research Group*, Zurich, November 2004.
56. Advanced Analysis of Dams; *ENDESA*, Barcelona, November 2004.
55. Nonlinear Analysis of Concrete Dams; *Korean Water Company (KOWACO)*, Seoul, June, 2004.
54. Dynamic Analysis of Arch Dams; From Theory to Applications. *Ministry of Water Resources*, Teheran, Iran, June 2004.
53. Theory of Dynamic Analysis of Arch Dams. *Sharif University*, Teheran, June 2004.
52. Nonlinear Dynamic Analysis of Dams; *Department of Applied Mathematics, Politecnico di Milano (MOX)*, May, 2004
51. Numerical Simulation of Alkali Aggregate Reaction in Concrete Dams, US Bureau of Reclamation, April 2004.
50. Dam Engineering Challenges; Seismic and AAR Analysis; *Academia Nazionale dei Lincei*, Rome March 2004
49. Dam Engineering Newest Challenges; *University of Rome, La Sapienza* Oct. 2003

48. Numerical Simulation of Concrete Deterioration, *Italcementi*, Bergamo, July 2003.
47. Fracture Mechanics of FRP Reparation, *University of Lecce*, July 2003.
46. 3D Nonlinear Dynamic Analysis of Dams, *University of Grenoble*, March 2003.
45. Deterioration of Reinforced and Massive Concrete; *University of Grenoble*, March 2003.
44. Numerical Simulation of Concrete Deterioration, *Swiss Federal Institute of Technology*, Lausanne, July 2002
43. 3D Nonlinear Dynamic Analysis of Concrete Dams, Tsinghua University, Beijing, PRC, Aug. 2002
42. Fracture Mechanics of Concrete Dams, China Yangtze Three Gorges Project Development Corp., and China Three Gorges University, Yichang, PRC, Aug. 2002
41. 3D Nonlinear Dynamic Analysis of Concrete Dams, China Institute of Water Resources and Hydropower Research (IWHR), Beijing, PRC, Aug. 2002
40. Numerical Simulation of Concrete Deterioration, *University of Venice*, June 2001.
39. Fracture Mechanics of Dams, *Politecnico of Milan*, June 2001.
38. Fracture Mechanics of Dams, *Tokyo Electric Power Company (TEPCO)*, Tokyo, Japan, October 1999.
37. Reflections on, and Applications of Fracture Mechanics in Concrete. *Politecnico di Milano*, Dec. 1998.
36. Fiber Optics Based Determination of Strains Around the Fracture Process Zone in Concrete WST. *Swiss Federal Institute of Technology*, Lausanne December 1998.
35. Dynamic Uplift Pressures in Dams under Earthquakes, *Swiss Federal Institute of Technology*, Zurich June 1998.
34. Numerical Simulation of Concrete Bridge Deck Deterioration, *Prof. Z. Bažant's 60^{th} Birthday Anniversary Workshop* in Prague, March 1998
33. Applications of Fracture Mechanics in Structural Engineering, *University of Leipzig*, Nov. 1997.
32. Fracture Mechanics of Concrete Dams, *ENEL/CRIS* Milan Italy, Nov. 1997.
31. Numerical Simulation of Concrete Bridge Deck Deterioration, *Ecole Normale Superieur de Cachan*, France, Oct. 1997.
30. 4th International Benchmark Workshop on Numerical Analysis of Dams, (Organized by ICOLD), Madrid, Sept. 1996 (Round Table)
29. Fracture Mechanics of Concrete Dams, *Central Research Institute of the Japanese Electric Power Industry*, Chiba, Japan, Nov. 5. 1993.
28. Fracture Mechanics of Concrete, *Obayashi Construction Company*, Tokyo, Japan, Nov. 4, 1993.
27. Water Fracture Interaction in Concrete, *Norwegian Institute of Technology (NTH)*, Trondheim, Norway, July 1993.
26. Fracture Mechanics of Concrete, *University of Rome, La Sapienza*, July 1992.
25. Fracture Mechanics Research on Dam Cracking; *B.C. Hydro*, Vancouver; Oct. 16, 1992.
24. Fracture Mechanics of Concrete Dams, *Universidad Politecnica de Madrid*, July 1992.
23. Fracture Mechanics of Concrete Dams, *Ecole Normale Superieure de Cachan*, Paris, France, March 1992.
22. Int. Conference on Fracture of Concrete, Breckenridge, CO 1992.

21. Fracture Mechanics of Concrete, *ISMES*, Bergamo, July 1990.
20. Fracture of Dams, *Tsinghua University*, Beijing, April 1990.
19. Fracture Mechanics of Concrete Dams, *Institute of Water Conservancy and Hydroelectric Power Research*, Beijing, April 1990.
18. Fracture of Concrete, *Swiss Cement Industry Research institute*, Wildegg, March 1990.
17. Fracture Mechanics of Dams, *Laboratoire Central des Ponts et Chaussées*, Paris, March 1990.
16. Fracture Mechanics of Concrete Dams, *ACRES International*, Niagara Falls, Canada, Dec. 7-8 1989.
15. Fracture Mechanics of Concrete Dams, *University of California*, Berkeley, Nov. 6 1989.
14. Fracture Mechanics of Concrete, *Colorado State University*, April 1989.
13. Fracture Mechanics of Concrete Gravity Dams, *Bureau of Reclamation*, Denver, March 1989.
12. Fracture Mechanics of Concrete Gravity Dams, *Northwestern University*, March 1989.
11. Fracture Mechanics of Concrete Gravity Dams, *EPRI Electric Power Advisory Group*, Chattanooga, TN, March 1989.
10. Fracture Mechanics of Concrete Gravity Dams, *Polytechnic of Madrid*, November, 1987.
9. Fracture Mechanics of Concrete Gravity Dams, *CRIS/ENEL*, July 1987, Milan, Italy.
8. Fracture Mechanics of Anisotropic Rock cutting, *Dowell-Schlumberger Research laboratory*, Tulsa, OK.
7. Computer Graphics in Structural Design, *King Faisal University*, Saudia-Arabia, march 18-23, 1986.
6. Some Engineering Applications of Fracture Mechanics, *Waterways Experimental Station*, Vicksburg, MS. Sept. 20-24, 1985.
5. Development of a mixed smeared and discrete crack model for concrete and geomaterial, *Dept. of Civil Engineering, Swiss Federal Institute of Technology*, Lausanne, Switzerland, June 1-15, 1983, June 1-15, 1984.
4. Finite Element Simulation of Crack Propagation, *Eidgenoessisches Institut fuer Reaktorforschung (EIR)*, Shaufhausen, Switzerland, July 30, 1982.
3. Finite Element Modeling of R/C using fracture mechanics, *Instituto Sperimentale Modelli e Strutture (ISMES)*, Bergamo, Italy, July 1982.
2. Finite Element Simulation of Crack Propagation *Swiss Federal Institute of Technology*, lausanne, Switzerland, July 9, 1982.
1. Automated Nonlinear Finite Element Analysis of Reinforced Concrete; a Fracture Mechanics Approach, *Swiss Federal Institute of Technology*, Zurich, Switzerland, June 21, 1981.

Supervised Dissertations

Ph.D.:

12. Golsa Mahdavi **Nonlinear Transient Analysis of an AAR affected Dam** 2020-2022.
13. Hariri, Mohammad **Innovative Numerical Modeling of Concrete Dams**, 2012-2015

12. Kang, Dae-Hung **Computational Environment for Real Time Hybrid Simulation**, 2010.
11. Puntel, Eric **Experimental and numerical investigation of the monotonic and cyclic behaviour of concrete dam joints**, Politecnico di Milano 2004.
10. Puatatsananon, Wiwat **Numerical Simulation of Coupled Chemical-Mechanical Deterioration of Concrete**, 2002
9. Chandra, K., **Interface Cracks: Fracture Mechanics Studies leading towards Safety Assessment of Dams**, May 1996.
8. Červenka, J., **Discrete Crack Modeling in Concrete Structures**, 1994.
7. Reich, R., **On the Marriage of Fracture Mechanics and Mixed Finite Element Methods: An Application to Concrete Dams**, 1993.
6. Prinaris, A., **Flow Processes in Nonlinear Material Modelling Synthesis and Homogenization**, 1990.
5. Gamal-El-Din, **Fractal Dimensions and Fracture Properties of Cracked Concrete**, 1990.
4. Ayari, M., **Static and Dynamic Fracture Mechanics of Concrete Gravity Dams**, 1988
3. Sikiotis, E., **Innovative Techniques in Structural Optimization**, 1987

M.S.:

35. Yuichiro Gakuhari **Sensitivity and Uncertainty Analyses of a Dam with AAR**
34. Graff, D. **Shear Strength of AAR Affected Concrete**, 2017
33. Spark R. **Shear Strength Deterioration due to ASR**, 2016
32. Prusinski, K. **Pushover Analysis of a Bridge Pier**, 2015
31. Sonavane, T. **Analysis of Arches**, 2014
30. Georg, R. **Historical Analysis of Arches and Modern Shells**, 2014
29. Stanko, Scott **Contributions to Real Time Hybrid Simulation Modeling**, 2012.
28. Segura, Christopher **Hybrid Simulation; Modeling and Testing**, 2011.
27. Basbolat, E. **Post-Processor to the Mercury Software for Hybrid Simulation**, Dec. 2010.
26. Nasr, K. **Coupled Fracture and Combustion in Solid Rocket Propellants**, May 2010.
25. Perotti, L. **Alkali Aggregate Reactions in Concrete Dams**, Politecnico di Milano, June 2004.
24. Ruolo, Dora **Interface Crack Joints Under Cyclic Loads**, Politecnico di Milano, Jan. 2004
23. Chang, P., **Finite Element/Fracture Mechanics Simulation of Heterogeous Materials**, 2002.
22. Gillan, Chad **Centrifuge Testing of Concrete Dams**, Aug. 2002
21. Puatatsananon, Wiwat **Probabilisitc Fracture Mechanics**, Aug. 1998
20. Hansen, Eric, **Rate Deterioration Investigation of Bridge Decks Based on Diffusion/Fracture Mechanics Numerical Study**, Aug. 1997.
19. Fox, Kristen, **Fracture Mechanics Analyses of Anchor Bolts**, Aug. 1996.

18. Ostrander, Keith, **Applications of Fiber Optics in the Strain Measurement of Structures**, Aug. 1996.
17. Shinmura, A., **Fluid Fracture Interaction in Pressurized Reinforced Concrete Vessels** , 1995
16. Roh, Y., **Numerical Simulation of Fluid Flows in Cracked Concrete**, 1995
15. Winkler, L. **Development of a Workbench of Mechanics, Materials and Structures Experiment**, 1994
14. Hermanrud, J. (CS) , **Development of a Three Dimensional Finite Element Post-Processor**, 1993
13. Wigner, W., **Three Dimensional Fracture Mechanics Analysis of an Arch Dam**, 1993.
12. Dewey, R. **Uplift Modelling for Fracture Mechanics Analysis of Concrete Gravity Dams**, 1993.
11. Waggoner, F., **Centrifuge Testing of Concrete Gravity Dams**, M.S. Aug., 1992.
10. Ryan, J., **Effect of Bi-Axial Confinements on Fracture Properties of Concrete, Laboratory and Field Tests**.
9. Broz, J. **Experimental Fracture Mechanics of Concrete Dams**, 1989.
8. Commander, B., **An Improved Method of Bridge Evaluation: Comparison of Field Test Results withComputer Analysis**, 1989.
7. Dambowy, J., **A Knowledge Based Expert System for the ACI Building Code**, 1989.
6. Doshi, S., **Knowledge Based Expert System for Reinforced Concrete Design Checking**, 1987.
5. Jones, M., **A Prototype Hybrid Expert System for Structural Design**, 1987.
4. Sikiotis, E., **Computer Graphics Aided Design of Reinforced Concrete Frames**, 1983.
3. Flango, R., **Graphical PreProcessor for Steel and Concrete Orthogonal Building Frames**, 1983.
2. Murad., M., **Partially Prestressed Concrete Beam Optimization**, 1983
1. Schwemmer, S., **Numerical Evaluation of the Quarter Point Singular Element**, 1983

Foreign Jury Member

1. Andreea Carpiuc-Prisacari (2016) (PhD Candidate; Ecole Normale Superieure de Cachan (France), *Experimental database with full-field measurements for mixed-mode crack propagation in concrete: comparison between experimental and numerical results.*
2. Kharazi, M. PhD Candidate; Ecole Normale Superieure de Cachan (France); Rapporteur of her PhD Thesis *Une méthodologie de modélisation pour l' évaluation de l' étanchéité des enceintes de confinement des centrales nucléaires* (A Model for the permeability assessment of nuclear reactor confinement vessel), 2014
3. Ragueneau, Frederic *These d'habilitation a la Recherche*, France, Oct. 2006.
4. Berthet-Rambaud, Philippe, *Structures Rigides Soumises aux Avalanches et Chutes de Blocs: Modélisation du Comportement Mécanique et Caractérisation de l'Interaction "Aléa-Ouvrage"*, Doctoral Thesis, Universite de Grenoble, July 2004.

5. Bournazel, Jean Pierre, *Contribution a l'Etude du Caractere Thermomecanique de la Maturation du Beton*, Doctoral Thesis, Ecole Normale Superieure, Cachan, July 1992.
6. Jouhari, M., *Dynamic Crack Growth with Internal Uplift Pressures*, Ecole Nationale des Ponts et Chaussees, Paris, France, 1992.

Lecture Notes Manuscripts

1. Structural Engineering; Analysis & Design, 664 pages
2. Structural Concepts and Systems for Architects, 265 pages
3. Reinforced Concrete 175 pages
4. Computer Literacy for Undergraduates, 233 pages
5. Finite Element Analysis of Frames, 280 pages
6. Finite Element Analysis, 280 pages
7. Advanced Mechanics of Materials, 280 pages
8. Fracture Mechanics, 474 pages

Those notes can be downloaded from my personal web page http://civil.colorado.edu/~saouma/Lecture-Notes

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Technical Reports

Over 100 Technical Reports written to sponsors.

Software Development

Mercury An Optimized Nonlinear Finite Element Code for Real Time Hybrid Simulation.

MERLIN 3D Nonlinear Finite Element Program, (1991-Present), Funded by Electric Power Research Institute (EPRI), and Tokyo Electric Power Service Company (TEPSCO).

Spider , a general purpose Windows/Open-GL based finite element graphical postprocessor. (1991-Present), Funded by Electric Power Research Institute (EPRI), and Tokyo Electric Power Service Company (TEPSCO).

KumoNoSu a general purpose 3D finite element generator particularly suited for cracked structures, reinforced concrete, and dam structures, (1999-present), Funded by Tokyo Electric Power Service Company (TEPSCO).

Beaver Program for the automation of the layout of double curvature arch dams

PARSIFAL (Particle Simulator for Analysis), a 2D/3D generator for heterogeneous materials with particle collision detection,(2002-Present), Funded by National Science Foundation

SIMSAR (Simulation of Silica Aggregate Reactions) in concrete, (2002-2003), Funded by Swiss Dam Safety Agency.

CDAP (Concrete Deterioration Analysis Program), coupled nonlinear multiphysics simulation of heat, moisture, chloride and carbon diffusion in concrete, (2002-Present), Funded by National Science Foundation.

Society Membership

1. Fellow and President (2013-2016) of the International Association for Fracture Mechanics of Concrete and Structures (FRAMCOS)
2. (Founding member) Swiss Society of Living Organ Donors (*Association Suisse des Donneurs Vivants d'Organe*)
3. American Concrete Institute

Committee Member

1. ACI 349 Concrete Nuclear Structures
2. ACI 446 Fracture mechanics of Concrete
3. ACI-ASCE Committee 447, Finite Element Analysis of Reinforced Concrete Structures.
4. RILEM TC-259-ISR Committee; Prognosis of Deterioration and Loss of Serviceability in Structures Affected by Alkali-Silica Reactions (Chair).
5. RILEM TC-258-AAA Avoiding alkali aggregate reactions in concrete - Performance based concept
6. Member International Association of Fracture Mechanics of Concrete Structures (IA-FraMCoS), President.

Reviewer for

1. National Science Foundation
2. American Concrete Institute
3. ASCE, J. of Engineering Mechanics
4. ASCE J. of Structural Engineering
5. ASCE J. of Engineering Materials
6. ASME Journal of Applied Mechanics
7. International Journal of Solids and Structures
8. International J. of Numerical Methods in Engineering
9. Journal of the American Ceramic Society

10. Journal of Earthquake Engineering and Structural Dynamics
11. Cement and Concrete Research
12. Int. Journal of Fracture Mechanics
13. Engineering Fracture Mechanics
14. National Science and Engineering Research Council, Canada
15. Italian Ministry of Research and University (MIUR)
16. European Journal of Earthquake Engineering
17. European Journal of Mechanics
18. Indian Society of Earthquake Technology Journal
19. Swiss National Research COuncil

Session Chairman

1. Chairman session "Structural applications and sustainability: Nuclear structures and storages", International Conference on Numerical Modeling Strategies for Sustainable Concrete Structures (SSCS), 2012 in Aix en Provence, France;
2. Chairman Plenary Lecture session (P. Rossi), International Conference on Numerical Modeling Strategies for Sustainable Concrete Structures (SSCS), 2012 in Aix en Provence, France;
3. Chairman of the "Thermal and vapor effects and cracking" session in the Conference on Concrete Structures Under Severe Conditions (CONSEC07), Tours, June 2007.
4. 39th US Japan Joint Panel Meeting on Wind and Seismic Effects (by Invitation only), Tsukuba, Japan, 2007.
5. Co-Chairman, WG-3 "Dissemination of Knowledge, Education and Training in a Distributed Environment", *2nd World Forum on Collaborative Research in Earthquake Engineering An Invitational Workshop*, Ispra, March 2007.
6. Chairman, Session 4, CONSEC 04 Fourth International Conference on Concrete under Severe Conditions of Environment and Loading, Seoul, June 2004
7. Chairman, Session 8, Size Effect, Fracture Mechanics of Concrete Structures, Cachan May, 2001.
8. Chairman Session VIII, , Europe-US Workshop on Fracture and Damage in Quasibrittle Structures, Prague Sept. 1994.
9. Chairman, Session 2-B, International Conference on Fracture Mechanics of Concrete Structures, Breckenridge, CO, June 1992.
10. Chairman, Session on Fracture of Dams, ACI Convention, 1991.
11. Chairman, Session II, International Workshop on Application of Fracture Mechanics to Dam Engineering, Lucarno Switzerland, Sept. 1990.

12. Chairman, Session Xb, Int. Conf. on Computer Aided Analysis and Design of Concrete Structures, Zell-Am-See, Austria, April 1990.
13. Chairman, Session H2, Fracture and Strain Softening I, 8th Int. Conf. on Structural Mechanics in Reactor Technology, Brussels, August 1985.
14. Chairman, Process Zone Session, International Conference on Fracture Mechanics of Concrete and Rock, Vienna, July 1988.

Conference Advisory Panels

1. Member of the Scientific Committee for CONSEC 2016 (Concrete under Severe Conditions).
2. International Conference on Numerical Modeling Strategies for Sustainable Concrete Structures (SSCS), 2012 in Aix en Provence, France; Member of the scientific Committee.
3. FramCos-8, Toledo (Spain) 2013, Member of Scientific Board.
4. FramCos-7, Seoul 20010, Member of Scientific Board.
5. Fifth International Conference on Concrete under Severe Conditions Environment and Loading, Tours, France, (2007) Member of the Scientific Committee.
6. FramCos-6, Cagliari 2007, Member of Scientific Board.
7. ICFXI International Conference on Fracture mechanics, Torino, 2005.
8. CONSEC 04 Fourth International Conference on Concrete under Severe Conditions of Environment and Loading, Seoul, June 2004
9. Third International Conference on Fracture Mechanics of Concrete Structures (FRAMCOS-3), Gifu Japan, Oct. 1998.
10. Fracture Mechanics for Hydroelectric Power Systems Symposium, Vancouver September 1-2, 1994
11. International Workshop on Dam Fracture and Damage, Chambéry, France, March 16-18, 1994, **Co-Organizer** with Mazars and Bourdarot.
12. International Workshop on Size Effect in Concrete Structures, Sendai, Japan, Oct. 31-Nov. 2, 1993.
13. International Conference on Computational Contact Mechanics, Southampton, UK, Sept. 1993.
14. International Conference on *Fracture Mechanics of Concrete Structures*, Coordinator, Breckendridge, CO 1992.
15. International Conference on *Dam Fracture*, **Co-Organizer** with R. Dungar, Boulder CO, Sept. 11-13, 1991. 100 Participants from 18 countries.
16. International Workshop on *Application of Fracture Mechanics to Dam Engineering*, **Co-Organizer** with R. Dungar and F. Whittmann, Lucarno Switzerland, Sept. 17-18, 1990.
17. International Conference on *Micromechanics of Failure of Quasi-Brittle Materials*, New-Mexico, June 1990.
18. Second International Conference on *Computer Aided Analysis and Design of Concrete Structures*, Zell Am See (Austria), April 1990.
19. International Conference on *Fracture of Rock and Concrete*, Houston, June 1987.

Host for External Visitors

1. Antoine Tixier, Ecole Normale Supérieure de Cachan, February-July 2010
2. Etienne Burdet, Ecole Normale Supérieure de Cachan, April-July 2009.
3. Gregory Lebon, Ecole Normale Supérieure de Cachan, April-July 2006.
4. Al-Mahaidi, Riadh, Monash University Australia, 9 months, 2000-2001.
5. Linner, Jens, Chalmers University, 2 months 1995.
6. Slovik, V., ETH, Zurich, 2 years, 1992-94
7. Dave Dollar, US Bureau of Reclamation, Denver (1991-1992, part time)
8. Plizzari, G., University of Brescia/ISMES, Italy, Research Associate, 12 Months, 1991-1992
9. Thiel, F., Ecole Central/Framatome, Paris, France, VSN, 16 months, 1991-1992.
10. Brühwiler, E., ETH Zurich, Switzerland, Research Associate 2 years, 1989-1990.
11. Kim, I., Pusan University, S. Korea, Sabbatic leave, 1 year, 1988.

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