CURRICULUM VITAE

Jay X. Wang, Ph.D., P.E.

Professor, Bobby E. Price professorship

Programs of Civil Engineering and Construction Engineering Technology

College of Engineering and Science

Louisiana Tech University

Ruston, LA 71272

USA

Mailing Address:	1511 Dauphine Dr., Ruston, LA 71270
Phone:	(318) 257-2934 (O)
	(318) 254-0640 (H)
Fax:	(318) 257-2306
E-mail:	xwang@coes.latech.edu

Education

9. 1992 - 6. 1998	**Ph. D**.; Geotechnical Engineering, Department of Civil and Environmental Engineering, University of Alberta, Edmonton, Canada
9. 1983 - 7. 1986	**M. Sc**.; Hydraulic Structural Engineering, Hohai University, Nanjing, China
9. 1979 - 7. 1983	**B. Sc**.; Hydroelectric Power Engineering, Hohai University, Nanjing, China

Registration

P. E. State of Louisiana, 2008 (Civil Engineer No. 33968)

Professional Experience

9. 2015 – present	Professor	Louisiana Tech University, LA, USA
9. 2008 – 8. 2015	Associate professor (tenured)	Louisiana Tech University, LA, USA
9. 2002 – 8. 2008	Tenure-track assistant professor	Louisiana Tech University, LA, USA
10. 1998 – 8. 2002	Research and development engineer	ADINA R & D, Inc., MA, USA
7. 1998 - 9. 1998	Research associate	University of Alberta, Canada
8. 1996 - 10. 1996	Software analyst	PISA, Inc., Canada
9. 1992 - 6. 1998	Research assistant/Teaching assistant	University of Alberta, Canada
8. 1988 - 8. 1992	Lecturer (Equivalent to Assist. Prof.)	Hohai University, China
7. 1986 - 8. 1988	Assistant Lecturer	Hohai University, China

Administrative Experience

9. 2011 – 8. 2023, Chair, Program of Civil Engineering

- Having chaired the CVEN program and coordinated the CVEN faculty to prepare for the ABET visit in October, 2014, and completed draft CE ABET Self-Study Report. On the average, devoted 6 ~7 hours per week since September 01, 2013 until June 30, 2014.
- Having completed a 30-day response report in March and June, 2015, for the ABET campus visit leading to the weakness removals on Student Outcomes (b) and (c).
- Attending COES LT (Leadership Team) weekly meeting as a LT Associate since January, 2016.
- Presiding weekly Civil Engineering faculty meeting.
- Leading frequent discussion and revision of undergraduate/graduate curricula.
- Developing strategic plans to increase Civil Engineering enrollments.
- Organizing bi-annual Civil Engineering industry advisory board meeting.
- Leading faculty for periodic course evaluations and assessments following ABET-approved Student Outcomes (SOs) and Program Educational Objectives (PEOs).
- Distributing undergraduate scholarships.
- Recruiting new faculty member as a search committee member.

12. 2014 – present, Coordinator, PhD Program of Materials and Infrastructure Systems

9. 2011 – 8.2013, Coordinator, Master's Program of Civil Engineering

Citizenship Status

US Citizen; Canadian Citizen

Honors/Awards

1. Professor of the Year (2017), voted by all the students in the programs of Civil Engineering and Construction Engineering Technology, Louisiana Tech University
2. 2015 Engineering Faculty Professionalism Award, Louisiana Engineering Foundation
3. Professor of the Year (2014), voted by ASCE Student chapter, Civil Engineering, Louisiana Tech University
4. Endowed Bobby E. Price Professorship, September 2009—present
5. Outstanding Research Award, recognizing valued contribution in research, College of Engineering and Science, Louisiana Tech University, September 2005
6. Granted US Permanent Residency (Green Card) through Outstanding Researcher/Professor Category, May 2005

7. The outstanding paper prize by Editorial Office of the Journal of Water Power for the paper titled '*The micro-volume method of computing earthquake inertial forces on an arch dam'*, January 1991
8. The outstanding paper prize by Chinese Society of Hydraulic Engineering for the paper titled '*The Rigid-elastic-plastic equilibrium method for the stability analysis of retaining structures on weak foundations'*, February 1990
9. The outstanding paper prize by the Hydraulic Engineering Society of Jiangsu Province for the paper titled '*A study of rigid block method for the stability analysis of dam-foundation system'*, August 1991
10. Ph.D. Scholarship, University of Alberta, 1992-1998

Scholarship

I. Book Chapters

1. X. Wang, Dynamic analysis of a water-soil-pore water coupling system. In: *PORO-MECHANICS III, Biot Centennial (1905-2005)*, Chapter 109, Y.N. Abousleiman, A. H-D. Cheng and F-J. ULM. (Editors), 2005 A.A. Balkema Publishers, a member of Taylor & Francis Group plc, ISBN: 04-1538-041-3, pp. 733-738.
2. X. Wang, K.J. Bathe and J. Walczak, A stress integration algorithm of J_3-dependent elasto-plasticity models. In: *Computational Fluid and Solid Mechanics*, Vol. 1, K.J. Bathe (editor), 2001 Elsevier Science Ltd., ISBN: 0-08-043964-0 (Combined set). pp. 542 – 545.
3. D.H. Chan, X.R. Wang & N.R. Morgenstern, Kinematic modeling of shear zone deformation. In: *Deformation and Progressive Failure in Geomechanics*, A. Asaoka, T. Adachi & F.Oka (Editors), 1997 Elsevier B.V., ISBN: 978-0-08-042838-3, pp. 389-394.
4. X.R. Wang, D.H. Chan & N.R. Morgenstern, A numerical scheme for modelling kinematic propagation of shear bands. In: *Numerical Models in Geomechanics, NUMOG V, Chapter 2: Instability and Strain Localization in Geomaterials*, G.N. Pande & S. Pietruszczak (Editors), 1995 A.A. Balkema, Rotterdam, Brookfield, ISBN: 90-5410-568-2, pp. 215 – 222.

II. Articles in peer-reviewed journals

[SCImago Journal & Country Rank (SJR) and Value (Q1 ~ Q4) indexes are provided for most of the journals where papers were published. Q1means highest values and Q4 means lowest values. All the information can be retrieved from: http://www.scimagojr.com/journalrank.php]

i) Articles submitted or in preparation

1. Omar S. Apu, Jay X. Wang, 2023, *Development of Standardized Consolidation Testing Procedure for Dredged Soil Using Simplified Self-Weight Consolidation Apparatus and Modified Oedometer***,** in preparation, to be submitted to ASCE Journal of Getechnical and Geo-environmental Engineering.
2. Sujan Baral, Jay X. Wang, Shaurav Alam, and William B. Patterson, 2022, *Dredged Soils in Louisiana Coastal Area.* In revision, to be submitted to Journal of Wetlands.

ii) Articles published

3. Debojit Sarker, Omar Shahrear Apu, Narendra Kumar, Jay X. Wang, and Joan G. Lynam, 2023, *Sustainable Lignin to Enhance Engineering Properties of Unsaturated Expansive Subgrade Soils*, ASCE Journal of Journal of Materials in Civil Engineering, Vol. 35(8): 04023259.
4. Berjees Ikra and Jay X. Wang, 2023, *Numerical investigation of the effect of water content variations in expansive clay subgrades***,** International Journal of Geotechnical Engineering, Vol. 17(2), 2023, 140-150.
5. Debojit Sarker and Jay X. Wang, 2022, *Moisture Influence on Structural Properties of Pavement on Expansive Soils,* Transportation Geotechnics, Vol. 35, July. Online available at https://www.sciencedirect.com/science/article/abs/pii/S2214391222000575.
6. Adnan Khan, Jay X. Wang, and Debojit Sarker, 2020, *Development of an Analytic Method for Analyzing Expansive Soil-Induced Stresses in Highway Pavement*. ASCE International Journal of Geomechanics, 04019160, Vol. 20(2), 2020.
7. Shaurav Alam, Ashlesh Banjara, Jay Wang, William B. Patterson, Sujan Baral, 2018, *Novel Approach in Sampling and Tensile Strength Evaluation of Roots to Enhance Soil for Preventing Erosion*, Open Journal of Soil Science, Vol. 8, 330-349, http://www.scirp.org/journal/ojss.
8. Md Adnan Khan, Jay X. Wang, and William B. Patterson, 2017, *A study of the swell-shrink behavior of expansive Moreland clay*, International Journal of Geotechnical Engineering, Published online, July 26, 2017, 1-13
9. Adnan Khan and Jay X. Wang, 2017, *Geothermal energy and its potential use in Louisiana*, Louisiana Civil Engineer, Journal of Louisiana Section, Vol. 25(2), 6-12.
10. Jay X. Wang, 2017, *Growth rate-based prediction of pile setup and its Application in Driven Pile Foundation Construction*, Geomechanics and Geoengineering, Vol. 12 (2), pp. 86 – 106.
11. Minhaz M. Shahriar, Jay X. Wang (corresponding author), Shaurav Alam and William B. Patterson, 2016, *Soil binding ability of vegetation roots in enhancing erosion resistance of a shallow slope*, the International Journal of Geotechnical Engineering, Vol. 10(4), 409-417.
12. Jay X. Wang, Neha Verma and Eric Steward, 2016, *Estimating Pile Set-up Using 24-h Restrike Resistance and Computed Static Capacity for PPC Piles Driven in Soft Louisiana Coastal Deposits*, Journal of Geotechnical and Geological Engineering, Vol. 34(1), pp. 267-283.
13. Adnan Khan and Jay X. Wang (corresponding author), 2015, *Development of a Graph Method for preliminary design of borehole ground-coupled heat exchanger in North Louisiana*, Energy and Buildings, 92, 389-397.
14. X. Wang and Mark Castay, 2012, *Failure analysis of the breached levee at the 17th street canal in New Orleans during hurricane Katrina*, Canadian Geotechnical Journal [SCImago Journal & Country Rank (SJR): 6/268, Q1], Vol. 49(7), pp. 812-834.

15. S. Wu and X. Wang, 2011, *Numerical simulation of shear band localization in geotechnical materials based on a nonlocal plasticity model*. Journal of Modern Transportation, Vol. 19, No. 3, pp. 186-198.
16. X. Wang, Neha Verma, Ching Tsai and Zhongjie Zhang, 2010, *A Study of Pile Setup-Southern Louisiana Clayey Soils*. Journal of Transportation Research Record [SJR: 49/331, Q2], Transportation Research Board, Vol. 3, No. 2202, pp. 37-44.
17. S. Wu and X. Wang, 2010, *Mesh-Dependence and nonlocal regularization of one-dimensional strain softening plasticity*, Journal of Engineering Mechanics [SJR: 79/331, Q2], ASCE, Vol. 136(11), pp. 1354-1365.
18. X. Wang and R.L. Sterling, 2007, *Stability analysis of a borehole wall during horizontal directional drilling*, Tunnelling and Underground Space Technology [SJR:15/268, Q1], Vol. 22 (5 & 6), 620-632.
19. X. Wang and L.B. Wang, 2007, *Dynamic analysis of a water-soil-pore water coupling system*, Computers and Structures [SJR:12/331, Q1], Vol. 85 (11-14), 1020-1031.
20. X. Wang and L. B. Wang, 2006, *Continuous interface elements subject to large shear deformations*, the International Journal of Geomechanics [SJR:5/111, Q1], ASCE, Vol. 6(2), 97-107.
21. L.B. Wang, X. Wang, L. Mohammad and C. Abadie, 2005, *Unified method to quantify aggregate shape angularity and texture using fourier analysis*, Journal of Materials in Civil Engineering [SJR:44/359, Q1], ASCE, Vol. 17(5), 498-504.
22. L.B. Wang, L.R. Hoyos, J. Wang, G. Voyadjis, and C. Abadie, 2005, *Anisotropic Properties of Asphalt Concrete: Characterization and Implications in Pavement Design and Analysis*, Journal of Materials in Civil Engineering [SJR:44/359, Q1], ASCE, Vol. 17(5), 535-543.
23. X. Wang and L. B. Wang, L.M. Xu, 2004, *Formulation of the return mapping algorithm for the elasto-plastic soil models*, Computers and Geotechnics [SJR:7/268, Q1], Vol. 31(4), 315-338.
24. L.B. Wang, X. Wang, L.N. Mohammad, and Yongping Wang, 2004, *Application of Mixture Theory in the Evaluation of Mechanical Properties of Asphalt Concrete*, Journal of Materials in Civil Engineering [SJR:44/359, Q1], ASCE, Vol.16(2), 167-174.
25. L. Xu and X. Wang, 2004, *Implicit stress integration algorithm for isotropic hardening elastoplastic constitutive models*, Journal of Hydro-Science and Engineering (Chinese), Vol. 2004(3), 24-27.
26. L. Xu and X. Wang, 2003, *Numerical simulation of shear band in clayey soils using finite deformation theory*, Yantu Gongcheng XueBao/Chinese Journal of Geotechnical Engineering [SJR:39/268, Q1], 26(2), 225−228.
27. X. Wang and J. Dong, 2003, *Formulation and study of thermal-mechanical coupling of saturated porous media*, Computers and Structures [SJR:12/331, Q1], Vol. 81(8-11), K.J. Bathe 60th Anniversary Issue,1019-1029.

28. X. Wang, D. Chan and N. Morgenstern, 2003, *Kinematic modeling of shear band localization using discrete finite elements*, International Journal for Numerical and Analytical Methods in Geomechanics [SJR:2/38, Q1], Vol. 27(4), 289-324.
29. X. Wang, D. Chan and N. Morgenstern, 2002, *Numerical modeling of shear bands by element bands*, International Journal for Numerical Methods in Engineering [SJR:2/50, Q1], Vol. 54, 1131-1159.
30. Zhitao He, Desheng Deng and X. Wang, 1994, *Finite element analysis of Tongjiezi concrete face rock-fill dam*, Design of Hydroelectric Power Station (Chinese), Vol. 10(3), 74-79.
31. C. Sheng and X. Wang, 1990, *An analysis of the effect of rainfalls on underground water table by means of non-linear parameter identification*, Journal of Dam Observation and Geotechnical Testing (Chinese), Vol. 14(6), 9-14.
32. X. Wang, 1989, *Micro-volume method of computing earthquake inertial forces on an arch dam*, Journal of Water Power (in Chinese), No. 2, 27-31.
33. X. Wang and C. Deng, 1989, *A study of rigid block method for the stability analysis of dam-foundation system*, Journal of Hohai University (in Chinese), Vol. 17(2), 66-71.
34. C. Deng and X. Wang, 1987, *The Rigid-elastic-plastic equilibrium method for the stability analysis of retaining structures on weak foundations*, Shuili Xuebao/Journal of Hydraulic Engineering [SJR:115/420, Q2], No. 10, 53-60.
35. X. Wang and S. Xia, 1987, *The Effect of strain ratio on rupture model experiment of dam foundation system with weak layers*, Journal of Hohai University (in Chinese), Vol. 15(6), 83-89.
36. X. Wang, 1987, *Difference Extrapolation method for thin plate problems*, Journal of Hohai University (in Chinese), Vol. 15(3), 93-97.

III. Papers presented at conferences

i) Peer-reviewed conference papers

1. Omar Shahrear Apu, Jay X. Wang, 2023, "A Study of Consolidation Tests on the Dredged Soils with a Large Moisture Content in Coastal Louisiana Using a Modified Oedometer," *Geo-Congress 2023*, March 26–29, 2023 | Los Angeles, California.
2. Sarker, D., and Wang, J. X. 2022, "Characterization of Soil-Geosynthetic Interaction to Evaluate Reinforcement Location in Pavement over Expansive Soils," *Geo-Congress 2022*, pp. 367-379, March 20–23, 2022 | Charlotte, North Carolina.
3. Omar Shahrear Apu, Jay X. Wang, 2022, "Assessment of Compression Index (c_c) of Louisiana Marsh Soils by Considering the Sedimentation State," *Geo-Congress 2022*, GSP 333, pp. 131-139, March 20–23, 2022 | Charlotte, North Carolina.
4. Sarker, D., and Wang, J. X. 2021, "Experimental Study on Soil-Water Retention Properties of Compacted Expansive Clay," *4th International Conference on Transportation Geotechnics (ICTG 2021)*, May 23-26, 2021, Chicago, Illinois.
5. Sarker, D. et al. 2021, "Application of Sustainable Lignin Stabilized Expansive Soils in Highway Pavement," *International Foundations Congress & Equipment Expo 2021*, May 10-14, 202, Dallas, TX.
6. Apu, O. S., Wang, J. X., and Sarker, D. 2021, "Evolution of Large-Strain One-Dimensional

Consolidation Test for Louisiana Marsh Soil," *International Foundations Congress & Equipment Expo 2021*, May 10-14, 2021, Dallas, TX.

7. Debojit Sarker and Jay X. Wang, 2021, Inverse Analysis Method on the Performance Evaluation of Geosynthetic Reinforcements in Highway Pavement on Expansive Soils, Geosynthetics Virtual Conference 2021, Industrial Fabrics Association International, Feb. 22-25, *2021*.

1. Sujan Baral, Jay X. Wang, Shaurav Alam and William B. Patterson, 2019, *Experimental and Analytical Studies on the Root Reinforcement Effect of a Grass Species, Spartina alterniflora*, ASCE Geo-congress 2019, GSP 313, pp. 86-96, Philadelphia, March 24-27, 2019.
2. Debojit Sarker, Jay X. Wang, and Md Adnan Khan, 2019, *Development of the Virtual Load Method by Applying the Inverse Theory for the Analysis of Geosynthetic-Reinforced Pavement on Expansive Soils*, ASCE Geo-congress 2019, GSP 310, pp. 326-329, Philadelphia, March 24-27, 2019.
3. Md Adnan Khan, Jay X. Wang, and Debojit Sarkar, 2018, *Stabilization of Highly Expansive Moreland Clay using Class-C Fly Ash Geopolymer (CFAG)*, International Foundation Congress and Equipment Expo (IFCEE) 2018 conference, Deep Foundation Institute, ASCE, Orlando, FL, USA, March 5-10, 2018.
4. Ikra, B.A. and Wang, J.X., 2017, *Numerical Simulation and Validation of Long-Term Moisture Fluctuations in Expansive Pavement Subgrades*, PanAm-UNSAT 2017, Second Pan American Conference on Unsaturated Soils, Geo-Institute, ASCE, Dallas, Texas, USA, November 12–15, 2017.
5. Md A. Khan, Jay X. Wang, William B. Patterson, 2017, Swelling-Shrinkage Properties of Expansive Moreland Clay, *PanAm-UNSAT 2017,* Second Pan American Conference on Unsaturated Soils, Geo-Institute, ASCE, Dallas, Texas, USA, November 12–15, 2017.
6. Khan, M.A., Wang, J.X., 2017, *Application of Euler-Bernoulli Beam on Winkler Foundation for Highway Pavement on Expansive Soils*, PanAm-UNSAT 2017, Second Pan American Conference on Unsaturated Soils, Geo-Institute, ASCE, Dallas, Texas, USA, November 12–15, 2017.
7. Md Adnan Khan, and Jay X. Wang, 2015, *Evaluation of low temperature ground coupled vertical heat exchanger in South Louisiana*, The IEEE GREENTECH 2015, GREENTECH for Economic and Environmental Sustainability: Surviving Change and Building the Future, New Orleans, Louisiana, April 15-17, 2015.
8. Md Adnan Khan, and Jay X. Wang, 2014, *Study on Energy Foundation Design in South Louisiana*, GeoCongress 2014, Atlanta, February 22-25, 2014, *Geotechnical Special Publication 234*, 3793-3800.
9. Minhaz M. Shahriar, Jay X. Wang and William B. Patterson, 2013. *Contribution of Shrub Roots on Enhancement of Slope and Embankment Stability in the Coastal Area of Louisiana*, Geo-Congress 2013, San Diego, CA, March 3-6, 2013 , Geotechnical Special Publication, GSP 231, pp. 1339-1348.
10. Eric Steward, X. Wang, 2011. *Predicting pile setup (freeze): A new approach considering soil aging and pore pressure dissipation*, Geo-Frontier 2011, Advances in Geotechnical

Engineering, ASCE, Dallas, TX, March 13-16, 2011, Geotechnical Special Publication, GSP 211, pp. 11-19.

11. X. Wang, Neha Verma, Ching Tsai and Doc Zhang, 2010. *Setup prediction of piles driven into Louisiana soft clays,* Advances in Analysis, Modeling & Design Section: Foundation Engineering Design Problems, Geotechnical Special Publication 199, Proceedings of the GeoFlorida 2010 Conference, February 20-24, 2010, West Palm Beach, Florida, USA, pp. 1573 – 1582.
12. X. Wang, Eric Steward, 2010. *Predictions of pile setup and its resistance factors for South Louisiana*, Deep Foundations and Geotechnical In situ Testing, GSP 205, ASCE, Proceedings of the 2010 GeoShanghai International Conference, June 3-5, 2010, Shanghai, China, pp. 129 - 134.
13. S. Wu and X. Wang, 2009. *Analysis of boundary conditions and computational stability of higher-order gradient plasticity models*, 10th US National Congress on Computational Mechanics, July 16-19, 2009, Columbus, Ohio, USA.
14. X. Wang and M. Castay, 2009. *Study of the soil-structure-pore water interaction of the breached levee system at the 17th street canal of New Orleans*, Proceedings of the 2009 Joint ASCE-ASME-SES Conference on Mechanics and Materials, Blacksburg, VA, June 24-27, 2009.
15. S. Wu and X. Wang, 2008, Comparison of boundary conditions of gradient elasticity and gradient plasticity, The Inaugural International Conference of the Engineering Mechanics Institute (EM08), ASCE, Minneapolis, Minnesota, May 18-21, 2008.
16. X. Wang and L.B. Wang, 2007, *Dynamic analysis of a water–soil–pore water coupling system*, the Fourth MIT conference on Computational Fluid and Solid Mechanics--Focus: Fluid-Structure Interactions, MIT, Cambridge, Massachusetts, June 13-15, 2007.
17. X. Wang and J. Dong, 2003, *Formulation and study of thermal-mechanical coupling of saturated porous media*, in Compilation of Abstracts for the Second MIT Conference on Computational Fluid and Solid Mechanics, June 17-20, K.J. Bathe (eds).
18. D. Chan, X. Wang and N. Morgenstern, 1997, *Kinematic modeling of shear zone deformation*, Deformation and progressive failure in geomechanics, IS-Nagoya'97, Akira Asaoka, Toshihisa Adachi, and Fusao Oka (eds), 389-394.
19. X. Wang, D. Chan and N. Morgenstern, 1995, *A numerical scheme for modelling kinematic propagation of shear bands*, Numerical Models in Geomechanics-NUMOG V, Pande & Pietruszczak (eds), 215-222.
20. X. Wang and S. Xia, 1988, *Discrepancy estimate of results of model test with strain ratio not equal 1*, Proceedings of conference of Chinese Hydraulic Engineering Society and Chinese Rock Mechanics Society, Nanjing, China, 75-81.
21. X. Wang and S. Xia, 1988, *Back analysis of strength parameters f, c and revision of overloading safety factor K*, Proceedings of conference of Chinese Hydraulic Engineering Society and Chinese Rock Mechanics Society, Nanjing, China, 150-156.

ii) Non-peer-reviewed conference papers

1. X. Wang, L.B. Wang and L.M. Xu, 2007, *an introduction to the stress integration algorithm for the j_3-dependent soil models*, 18th Engineering Mechanics Division Conference of the ASCE, Blacksburg, VA, June 3-6, 2007.
2. X. Wang and R. Sterling, 2006, *Finite element analysis of the instability of borehole wall during horizontal directional drilling*, 24th International NO-DIG 2006 Conference and Exhibition, Queensland, Australia, October 29-November 2, 2006.
3. X. Wang and L. Wang, 2006, *Continuous shear band Elements Subject to Large Shear Deformations*, 15th U.S. National Congress on Theoretical and Applied Mechanics, Boulder, Colorado, June 25-30, 2006.
4. X. Wang, 2005, *Numerical modeling strain localization: use of finite elements for shear band zones*, Abstract in Proceedings of McMat2005: 2005 Joint ASME/ASCE/SES Conference on Mechanics and Materials, CD version, Baton Rouge, Louisiana, USA, June 1-3, 2005.
5. A. Jaganathan, E. Allouche , J. Wang and M. Baumert, 2005, *Experimental and numerical evaluation of impact of folds on the pressure rating of CIPP liners*, International Society for Trenchless Technology - 23rd No-Dig International Conference and Exhibition, No-Dig 2005, Rotterdam; Netherlands; 19 September 2005 through 21 September 2005, pp. 217-226.
6. X. Wang and R.L. Sterling, 2004, *Stability analysis of a borehole wall in horizontal directional drilling*, NO-DIG 2004, NASTT, New Orleans, March 21-24, CD version, E1-02-1---E1-02-10 (ten pages).

IV. Technical Reports

i) Commercial finite element software manual (ADINA)

ADINA Theory and Modeling Guide, Volume I: ADINA, 2002

- Arruda-Boyce material model-hyperelastic effects pp. 314-316
- Hyper-foam material model-hyperelastic effects pp. 316-317
- Viscoelastic effects pp. 325-327
- *Cam-clay material model*, pp. 337-340
- *Mohr-Coulomb material model*, pp. 341-345
- *Porous media formulation*, pp. 350-355
- *The consideration of strain rate effect*, page 256
- *Lubby 2 creep model*, pp. 282-284

ii) Reports written as part of the deliverables on research contracts

1. Wang, J. X., Sarker, Debojit., and Ikra, B. A. (2018). Development of a Mechanistic-based Design Method for Geosynthetic-Reinforced Pavement on Expansive Soils and Prediction of Moisture Content Fluctuations in Subgrades, final report for research project SPTC15.1-23, sponsored by the South Plains Transportation Center, The University of Oklahoma, Norman, OK 73019, https://trid.trb.org/view/1568487, (Access Date: June 11,, 2019)
2. Wang, J. X., Khan, M. A., and Ikra, B. A. (2017). Impact of Severe Drought on the Compacted Expansive Clays (Subgrade) in Northern Louisiana, final report for research project SPTC14.1-76, sponsored by the South Plains Transportation Center, The

University of Oklahoma, Norman, OK 73019, https://trid.trb.org/view/1500364, (Access Date: June 11, 2019).

3. Final report, Estimating Setup of Piles Driven into Louisiana Clayey Soils, submitted to Louisiana Transportation Research Center (178 pages).
4. 6-month interim report, Estimating Setup of Piles Driven into Louisiana Clayey Soils. Submitted to Louisiana Transportation Research Center (103 pages).
5. 3-month progress report, Estimating Setup of Piles Driven into Louisiana Clayey Soils. Submitted to Louisiana Transportation Research Center.
6. A model to predict shear failure of infrastructures using finite element method. Final Report submitted to LA EPSCoR, sponsored by NSF and The Louisiana Board of Regents.
7. Shear band localization: Mathematical modeling, numerical implementation and experimental validation, interim reports (1), (2) and (3) submitted to Louisiana Board of Regents.
8. 3-D finite element analysis of Tongjiezi rock-fill dam and suggestions for the treatment of the sand pool. Final report submitted to Chengdu Hydro-electric Investigation and Design Institute.
9. An experimental study on the tunnels on Manwan gravity dam. A report submitted to Qunmin Hydro-electric Investigation and Design Institute.
10. Annual report of the practical use of FEM for the concrete dam designs. Internal report, Hohai University.

V. Funded Research Projects

1. Title: Development of design criteria for the use of articulating concrete mats and geosynthetic separator fabric as protective features for earthen containment dikes exposed to localized wave forces
   Amount awarded: $95,000.00
   Sponsor: Louisiana Sea Grant
   Duration: 06/01/2022 – 05/31/2025
   PI(s): Wang
2. Title: Civil Engineering Senior Design Project: Multiple projects for seven teams
   Amount awarded: $5,000
   Sponsor: Louisiana Department of Transportation and Development
   Duration: 09/01/2022 – 06/30/2023
   PI(s): Wang
3. Title: Civil Engineering Senior Design Project: Multiple projects for seven teams
   Amount awarded: $5,000
   Sponsor: Louisiana Department of Transportation and Development
   Duration: 09/01/2021 – 06/30/2022
   PI(s): Wang
4. Title: Civil Engineering Senior Design Project: Multiple projects for seven teams
   Amount awarded: $5,000

Sponsor: Louisiana Department of Transportation and Development
Duration: 09/01/2020 – 06/30/2021
PI(s): Wang

5. Title: Civil Engineering Senior Design Project: Multiple projects for seven teams
   Amount awarded: $5,000
   Sponsor: Louisiana Department of Transportation and Development
   Duration: 09/01/2019 – 06/30/2020
   PI(s): Wang
6. Title: Development of a standardized (American Society for Testing and Materials, ASTM), repeatable, and consistent geotechnical laboratory testing procedure for the Low Stress Consolidation Test for the Marsh Fill
   Amount awarded: $75,000.00
   Sponsor: Louisiana Sea Grant
   Duration: 06/01/2019 – 05/31/2022
   PI(s): Wang
7. Title: Civil Engineering Senior Design Project: Multiple projects for seven teams
   Amount awarded: $5,000
   Sponsor: Louisiana Department of Transportation and Development
   Duration: 09/01/2018 – 06/30/2019
   PI(s): Wang
8. Title: Civil Engineering Senior Design Project: Multiple projects for seven teams
   Amount awarded: $5,000
   Sponsor: Louisiana Department of Transportation and Development
   Duration: 09/01/2017 – 06/30/2018
   PI(s): Wang
9. Title: Development of a Mechanistic-based Design Method for Geosynthetic-Reinforced Pavement on Expansive Soils
   Amount awarded: $34,192
   Sponsor: South Plain Transportation Center (SPTC)
   Duration: 03/01/2016 – 02/28/2017
   PI(s): Wang
10. Title: Civil Engineering Senior Design Project: Multiple projects for seven teams
    Amount awarded: $5,000
    Sponsor: Louisiana Department of Transportation and Development
    Duration: 09/01/2016 – 06/30/2017
    PI(s): Wang
11. Title: Geotechnical Engineering Laboratory Enhancement
    Amount awarded: $55,783 + $8,217 cash match
    Sponsor: BoRSF-Enhancement, Board of Regents, Louisiana
    Duration: 06/01/2016 – 06/30/2017
    PI(s): Wang
12. Title: Soil binding ability of natural vegetation *Spartina alterniflora* established on dredged soils in Louisiana coastal area

Amount awarded: $75,000
Sponsor: Louisiana Sea Grant
Duration: 06/01/2015 – 05/30/2018
PI(s): Wang

13. Title: Impact of Severe Drought on the Compacted Expansive Clays (Subgrade) in Northern Louisiana
    Amount awarded: $54,542
    Sponsor: South Plain Transportation Center (SPTC)
    Duration: 11/2014 – 10/2016
    PI(s): Wang
14. Title: Development of an Innovative Model for Analyzing Current (Wave)-Dike Vegetated Soil Interaction and its Application in Louisiana Coastal Restoration Projects
    Amount awarded: $10,000
    Sponsor: NSF-EPSCoR, Board of Regents, Louisiana
    Duration: 10/01/2014 – 09/30/2015
    PI(s): Wang
15. Title: Application of soil bioengineering (ecosystem-based) approaches for riparian restoration in coastal area of Louisiana
    Amount awarded: $75,000
    Sponsor: Louisiana Sea Grant
    Duration: 07/01/2011 – 06/30/2014
    PI(s): Wang
16. Title: Energy piles driven in soft clayey soil ground with high ground water table
    Amount awarded: $10,000
    Sponsor: NSF-EPSCoR, Board of Regents, Louisiana.
    Duration: 03/01/2012 – 06/30/2013
    PI: Wang
17. Title: Capstone senior project: Segment E of I-49 North (JCT. LA TO US 71)
    Amount awarded: $5,000
    Sponsor: Louisiana Department of Transportation and Development (LA DOTD)
    Duration: 09/01/2011 – 06/30/2012
    PI(s): Wang
18. Title: Estimating setup of piles driven in Louisiana clayey soils
    Amount awarded: $125,000
    Sponsor: Louisiana Department of Transportation and Development (LA DOTD), Louisiana
    Duration: 05/15/2008 – 11/15/2009
    PI(s): Wang
19. Title: A model to predict shear failure of infrastructures using finite element method
    Amount awarded: $9,700
    Sponsor: NSF-EPSCoR, Board of Regents, Louisiana
    Duration: 02/01/2006 -- 01/31/2007
    PI(s): Wang

20. Title: Shear band localization: mathematical modeling and numerical implementation and experimental validation
    Amount awarded: $105,336
    Sponsor: RCS, Board of Regents, Louisiana
    Duration: 06/01/2005 – 06/30/2010
    PI(s): Wang
21. Travel grants for emerging faculty (Invited by the Engineering Mechanics Institute, ASCE for a conference presentation
    Amount awarded: $1,000
    Sponsor: Board of Regents, Louisiana
    Duration: 05/01/2005 – 04/30/2006
    PI(s): Wang
22. Title: Failure study of the breached levees in New Orleans using the developed state-of-the-art shear band localization model
    Amount awarded: $1,000
    Sponsor: The COES summer research program, Louisiana Tech University
    Duration: 06/01/2006 – 08/31/2006
    PI(s): Wang
23. Title: Acquisition of large-scale trenchless technology and testing and research facility
    Amount awarded: $272,495
    Sponsor: National Science Foundation
    Duration: 10/01/2004 – 09/30/2007
    PI(s): Sterling, Allouche, Wang
24. Title: Numerical modeling of non-ferrous terrabrute restraint joint under static and dynamic loading conditions
    Amount awarded: $9,638
    Sponsor: IPEX Inc., Canada
    Duration: 03/01/2007 – 02/28/2008
    PI(s): Allouche, Wang, Balmer
25. Title: Enhancement and testing of the terrabrute^{TM} restraint joint
    Amount awarded: $25,000
    Sponsor: IPEX Inc., Canada
    Duration: 06/01/2005 – 05/30/2006
    PI(s): Allouche, Balmer, Wang
26. Title: 3-D finite element analysis of Tongjiezi rock-fill dam
    Sponsor: Chengdu Hydro-electric Investigation and Design and Development Institute (China)
    Duration: 09/1990 – 08/1993
    PI(s): Wang, Deng (After Wang left China September 1992, co-PI took the PI responsibility)
27. Title: An experimental study on the tunnels in Manwan gravity dam
    Sponsor: Qunmin Hydro-electric Investigation and Design and Development Institute (China)
    Duration: 08/1986 – 10/1990

PI(s): Pan, Wang

28. Title: Risk analysis of Fuzilin buttress dam
    Sponsor: The Electricity Department of Anhui Province
    Duration: 09/1988 – 12/1989
    PI(s): Sheng, Wang

Post-Secondary Teaching Experience

I. Louisiana Tech University

Lectured courses and student evaluation

Couse No.	Course Title	Level	Quarter	Student Evaluation*
ENGR 220	Statics and Mechanics of Engineering	U	Fall, 2002	3.5/3.3
CVEN 440	Foundation Engineering	U/G	Winter, 2002	3.4/3.4
CVEN 324	Introduction to Soils Engineering (Lecture + Lab)	U	Spring, 2003	3.7/3.3
CVEN 325	Introduction to Foundation Engineering	U	Fall, 2003	3.6/3.5
CVEN 440	Foundation Engineering	U/G	Winter, 2003	3.4/3.6
MEMT 588	Inelastic Deformation (Elsto-Plasticity Theories)	G	Spring, 2004	3.8/3.3
CVEN 324	Introduction to Soils Engineering (Lecture + Lab)	U	Spring, 2004	3.7/3.3
ENGR 220	Statics and Mechanics of Engineering	U	Fall, 2004	3.4/3.2
CVEN 325	Introduction to Foundation Engineering	U	Fall, 2004	3.9/3.2
MEMT 206	Statics and Mechanics of Engineering	U	Winter, 2004	3.6/3.4
CVEN 324	Introduction to Soils Engineering (Lecture + Lab)	U	Spring, 2005	3.8/3.5
MEMT 588	Inelastic Deformation (Elsto-Plasticity Theories)	G	Spring, 2005	3.5/3.5
ENGR 220	Statics and Mechanics of Engineering	U	Fall, 2005	3.3/3.3
CVEN 325	Introduction to Foundation Engineering	U	Fall, 2005	3.6/3.3
CVEN 440	Foundation Engineering	U/G	Winter, 2005	3.9/3.6
CVEN 324	Introduction to Soils Engineering	U	Spring, 2006	3.8/3.5
MEMT 312	Dynamics	U	Spring, 2006	3.5/3.5
ENGR 220	Statics and Mechanics of Engineering	U	Fall, 2006	3.8/3.3
CVEN 325	Introduction to Foundation Engineering	U	Fall, 2006	3.6/3.3
CVEN 440	Foundation Engineering	U/G	Winter, 2006	3.8/3.5
MEMT 312	Dynamics	U	Spring, 2007	2.9/3.5
CVEN 324	Introduction to Soils Engineering	U	Spring, 2007	3.8/3.5
ENGR 220	Statics and Mechanics of Engineering	U	Fall, 2007	3.7/3.3
CVEN 325	Introduction to Foundation Engineering	U	Fall, 2007	3.4/3.3
CVEN 440	Foundation Engineering	U/G	Winter, 2007	3.4/3.5
CVEN 324	Introduction to Soils Engineering	U	Spring, 2008	3.5/3.5

CVEN 325	Introduction to Foundation Engineering	U	Fall, 2008	3.0/3.1
CVEN 440	Foundation Engineering	U/G	Winter, 2008	3.5/3.4
CVEN 324	Introduction to Soils Engineering	U	Spring, 2009	3.9/3.6
CVEN 325	Introduction to Foundation Engineering	U	Fall, 2009	3.9/3.5
CVEN 440	Foundation Engineering	U/G	Winter, 2009	3.9/3.5
CVEN 324	Introduction to Soils Engineering	U	Spring, 2010	3.8/3.7
ENGR 657 (1)	Soil Strength and Slope Stability	PhD	Summer, 2010	N/A
ENGR 657 (2)	Driven Piles in Engineering Practice	PhD	Summer, 2010	N/A
CVEN 325	Introduction to Foundation Engineering	U	Fall, 2010	4.0/3.4
MEMT 588	Inelastic Deformation (Elasto-Plasticity Theories)	G	Fall, 2010	3.9/3.4
CVEN 440	Foundation Engineering	U/G	Winter, 2010	3.9/3.6
CVEN 324	Introduction to Soils Engineering	U	Spring, 2011	3.6/3.7
CVEN 492	Capstone Senior Design (1)	U	Fall, 2011	3.7/3.5
CVEN 325	Introduction to Foundation Engineering	U	Fall, 2011	3.7/3.5
CVEN 493	Capstone Senior Design (2)	U	Winter, 2011	3.9/3.7
CVEN 510	Advanced Soil Mechanics	G	Winter, 2011	4.0/3.7
ENGR 657 (2)	Soil Strength and Slope Stability	PhD	Winter, 2011	4.0/3.7
CVEN 494	Capstone Senior Design (3)	U	Spring, 2012	3.3/3.6
CVEN 324	Introduction to Soils Engineering	U	Spring, 2012	3.4/3.6
CVEN 325	Introduction to Foundation Engineering	U	Fall, 2012	3.9/3.6
CVEN 440	Foundation Engineering	U/G	Winter, 2012	3.5/3.5
MEMT 588	Inelastic Deformation (Elasto-Plasticity Theories)	G	Winter, 2012	3.8/3.3
CVEN 324	Introduction to Soils Engineering	U	Spring, 2013	3.9/3.4
CVEN 325	Introduction to Foundation Engineering	U	Fall, 2013	3.9/3.5
CVTE 475	Soils in Construction	U	Fall, 2013	3.3/3.5
CVEN 440	Foundation Engineering	U/G	Winter, 2013	3.9/3.3
CVEN 324	Introduction to Soils Engineering	U	Spring, 2014	3.8/3.4
CVEN 325	Introduction to Foundation Engineering	U	Fall, 2014	4.0/3.5
CVTE 475	Soils in Construction	U	Fall, 2014	3.3/3.5
CVEN 440	Foundation Engineering	U/G	Winter, 2014	4.0/3.5
CVEN 324	Introduction to Soils Engineering	U	Spring, 2015	3.9/3.5
CVEN 325	Introduction to Foundation Engineering	U	Fall, 2015	4.0/3.4
CVTE 475	Soils in Construction	U	Fall, 2015	2.9/3.4
CVEN 440	Foundation Engineering	U/G	Winter, 2015	4.0/3.7
CVEN 324	Introduction to Soils Engineering	U	Spring, 2016	3.9/3.5
CVEN 325	Introduction to Foundation Engineering	U	Fall, 2016	3.9/3.5
CVEN 492	Capstone senior Design	U	Fall, 2016	4.0/3.5
CVEN 440	Foundation Engineering	U/G	Winter, 2016	3.9/3.5
CVEN 493	Capstone senior Design	U	Winter, 2016	3.8/3.5
CVEN 324	Introduction to Soils Engineering	U	Spring, 2017	3.9/3.5

CVEN 494	Capstone senior Design	U	Spring, 2017	4.0/3.5
CVEN 325	Introduction to Foundation Engineering	U	Fall, 2017	3.9/3.5
CVEN 492	Capstone senior Design	U	Fall, 2017	4.0/3.5
CVEN 440	Foundation Engineering	U/G	Winter, 2018	3.8/3.7
CVEN 493	Capstone senior Design	U	Winter, 2018	3.8/3.7
CVEN 324	Introduction to Soils Engineering	U	Spring, 2018	4.0/3.5
CVEN 494	Capstone senior Design	U	Spring, 2018	3.9/3.5
CVEN 325	Introduction to Foundation Engineering	U	Fall, 2018	4.0/3.6
CVEN 492	Capstone senior Design	U	Fall, 2018	3.9/3.6
CVEN 440/540	Foundation Engineering	U/G	Winter, 2019	3.7/3.6
CVEN 493	Capstone senior Design	U	Winter, 2019	3.9/3.6
CVEN 324	Introduction to Soils Engineering	U	Spring, 2018	Pending
CVEN 494	Capstone senior Design	U	Spring, 2018	Pending
* A/B, A—grade for Jay Wang, B—Average grade for Civil Engineering Program, and a total grade is 4.0.				

Research Experience

I. Louisiana Tech University (September 2002-present)

--- Prediction of settlement and failure of coastal protection structures, Geothermal foundation, Pile foundation, Levee slope stability, Anti-erosion ability analysis of vegetated soils, Research and development of Finite Element models, Application of FEA to Structural Engineering and Geotechnical Engineering

1. **Development of an innovative model for analyzing current-(wave) dike-vegetated soil interaction and its application in Louisiana coastal restoration projects**

   Commercial software Delf3D-FLOW and Delf3D-SWAN are applied to the specific project sites to simulate hydrodynamic process due to waves, tides, winds and col currents. Wave heights, hydro-dynamic pressures and current velocities are obtained from the analyses of various critical cases. In order to predict dynamic state of sea beds of the coastal areas, Delf3D-MOR is used and closely coupled with the FLOW and SWAN modules for sediment transport depictions. In the analyses, vegetation effects in reduction of flow velocity and wave heights, decrease in sediment transport and more sedimentation are effectively considered in projects such as BA-42, BA-68, and ME-22(completed)). Commercial software ADINA is utilized to model rock (earthen) dikes or sheet piles for failure and/or settlement prediction by applying the results from the Delf3D, such as hydro-dynamic pressure and wave height. The rock (earthen) dikes that will be modeled can be built with a floating section, displaced section or excavated and replaced section (e.g. LA-06). Geosynthetic-reinforced and concrete (or stone) column-supported earthen dikes can also be accurately modeled. Wave velocities and pressures from Delf3D to calculate erosive capacities are applied to the erosion prediction models by Annandale (2006), and by Hanson and Cook (2004), respectively, with erosion resistances (erodibility index)

calculated based on field testing (VST, CPT, etc.) results, to predict erosion state of the dredged soils before and after native vegetation is planted.

2. **Use of geothermal energy through traditional structural foundations for building cooling and heating in Louisiana**

   As the first part, the potential use of geothermal energy integrated in traditional building foundation and its compatibility with the current practice of building construction in Louisiana are analyzed and evaluated. To make the design process simpler, fundamental research is done to develop graphs and charts for the geothermal design of regular deep foundations, which have been plotted exclusively for the soil and groundwater conditions in Louisiana. From the graphs if the structural designer knows the HVAC load of the building he/she can use the charts to place the pile length and spacing in such a way that can maximize the extraction of geothermal energy from the building foundation. As another goal, the thermal impact on energy piles under cycles of heating and cooling process is studied by considering thermo-hydro-mechanical coupling. This part of research seeks to establish an accurate and reliable thermo-hydro-mechanical coupling model to analyze the thermal effect of energy pile subject to geo-thermal heating and cooling circulation.

3. **Failure analysis of the breached levee at the 17th Street Canal in New Orleans during Hurricane Katrina**

   Failure of the levee system at the 17th Street Canal was investigated by conducting finite element analyses based on the subsurface exploration data released by the US Army Corps of Engineers, the IPET (2007), and the ILIT (Seed et al. 2006). Total stress–based and fully coupled effective stress–based analyses were both performed for the breached levee system. It was found that a gap formed and extended along the interface between the floodwall and levee fills on the canal side in the total stress–based analysis. However, no gap was seen in the same place based on the effective stress analysis. In the effective stress analysis, large pore pressure was found in the beach sand layer. The pore pressure greatly offset the effective overburden pressure in the lacustrine clay layer, which caused yielding of a broad area in the layer. Shear stress, shear strain, and lateral deformation distributions across the foundation soil layers below the levee toe at the protected side have strongly shown the possible occurrence of shear strain localization in the lacustrine clay layer near the toe of the sheet pile wall. Evidences from the effective stress analysis and the field observation of shear failure plane presented in the IPET report suggest that a localized shear zone might have initiated below the levee toe and around the tip of the sheet pile and propagated in the landward direction. During the progressive failure that occurred in the weak lacustrine clay zone, mobilization of a part of the levee system along the shear band on the protected side might have caused a gap between the floodwall and the levee fills.

   Since the research was published in July of 2012, significant attention has been drawn among those senior engineers who worked with the Corps of Engineers for a long time in the area of New Orleans. More and more evidences have been found that underseepage-induced lateral translational stability failure, instead of the gap formed between I-wall and levee soils, might be the real mechanism of the levee failure.

4. Contribution of grass roots on enhancement of slope and embankment stability

One of the cost-effective and environmental friendly solutions to enhance ground slope stability especially in coastal areas is to plant vegetation such as grass. A study comprising experimental work and numerical simulation was undertaken to evaluate the effect of plants' roots on sloping ground stability. Plain soil samples with and without roots of grasses were collected from Ruston, Louisiana, and direct shear tests was performed on the samples to study effect of roots on soil shear strength. The study also included tensile strength of the grass roots. Based on results from the tensile and direct shear tests, slope stability analyses were performed to demonstrate the grass soil-binding capabilities. In the analyses, those roots were considered as independent anchor reinforcements for which tensile strengths were specified from tested samples with different root diameters. Variations in factor of safety of the slopes with and without root reinforcement subjected to different root diameters and different depths were investigated for the collected plants. An efficient method is being developed to evaluate the shear strength of grass root-reinforced soils and vegetation-covered soil slopes.

5. Estimating the setup of piles driven into Louisiana clayey soils

Two types of mathematical models for pile setup prediction, the Skov-Denver model, and the newly developed rate-based model, were established from all the dynamic and static testing data, including restrikes of the production piles, restrikes, static and statnamic tests of the test piles at the LA-1 Relocation project. Pile testing data from other sites, such as Mo-Pac- Railroad Overpass, Bayou Liberty, and Calcasieu River etc., have been used for model verification. 21 out of the 115 restrike records of the production piles, and three load testing records from the nine tested piles were obtained at or longer than two weeks after pile installation. The conventional Skov-Denver model is achieved with the setup parameter *A* equal to 0.57, and the normalized ultimate shaft capacity from the rate-based model is 1.846 on the basis of the entire restrike and load testing data. Based on the rate-based model with limited amount of long-term production pile restrike data, it is predicted that the ultimate shaft capacities of the piles were about twice the measured shaft capacities at the 24-hour restrike. In general, the piles at the LA-1 relocation project reaches about 90~95% of the ultimate shaft capacities within two weeks after installation.

6. Numerical modeling and experimental validation of inception and propagation of shear band localization

A new class of the finite element to simulate the inception and propagation of shear band localization was formulated. The propagating shear band was modeled with independent discrete shear band elements, which were automatically generated, and go through the original finite element mesh. Original solid elements and shear band elements were modeled using rate-independent elasto-plastic-damage constitutive descriptions. A complete computational system was systematically developed, which covered those techniques such as generating shear band elements, breaking up original solid elements, re-shaping and re-numbering elements, merging multiple shear bands, handling varying total degrees of freedom, etc. Double yield surface-damage cap models, such as the Matsuoka-Nakai model and the Lade model, were employed and the corresponding bifurcation criterion for the inception of shear band localization was derived. Some specific strategies were employed to eliminate or alleviate the pathological mesh dependency. The finite element analysis of strain localization has applied to finite strain cases using the

updated Lagrangian formulation with assumptions of Hencky strain and multiplicative decomposition for the deformation gradient matrix.

7. **Borehole stability in the case of mini-horizontal directional drilling**

   The borehole stability problem, from the collapse of granular soils near the borehole wall to the hydraulic fracturing or tensile rupture induced by high drilling mud pressure, was studied using a robust but advanced numerical tool—the finite element method. Unlike closed-form analytical formulae based on the classic elasto-perfect plasticity theories or the empirical equations dependent on statistical analyses for computations of the stresses near the horizontal borehole, the numerical model easily integrated specific elastoplastic constitutive descriptions (strain hardening and softening), inhomogeneities, and anisotropies of soils. The in-situ earth pressure were reasonably accounted for prior to the construction of the horizontal directional drilling, and the sequential construction procedures (excavation of the pilot hole and back reaming, etc.) were incorporated in the elastoplastic model to get realistic stress distributions. The Formation of the thin tough filter cake was studied by coupling the mechanics of the soil with the drilling fluid interactions. The criterion for the unstable soil sloughing will be associated with the fluid behavior of loose sand, commonly referred to as quick sand, which is also defined as soil liquefaction in Geotechnical Engineering.

8. **The continuous interface element and its application to the soil-structure interaction modeling**

   A soil-structure interface, subject to large shear deformation, was modeled using the proposed interface element. In the developed algorithm, continuous interface elements with a finite thickness were reconstructed at every load step based on the current interface configuration, by employing the concept of contact band element. Special strain expressions for the continuous interface elements were derived with regard to the characteristics of shear strain concentration along the interface.

II. ADINA R & D Inc. (October 1998-August 2002)

--- Commercial finite element software development

1. **Visco-elastic polymeric material models and their applications to biomechanics**

   Motivated by the assumption of slight or high compressibility of the high-polymeric elastomers in nature, the deformation is decomposed into volumetric elastic and isochoric visco-elastic parts. The Helmholtz free energy function was defined as the sum of volumetric and isochoric response functions, and a configuration free energy function representing the visco-elastic response. Within the framework of hyperelasticity in which a total stress-total strain relationship rather than the rate formulation was defined, the Total Lagrangian kinematical description at finite strain was employed, where the second Piola-Kirchhoff stress and the Green-Lagrangian strain were involved. This formulation was applied to *the Ogden, the Mooney-Rivlin, the Arruda-Boyce and the hyper-foam* material models. These visco-elastic models can be easily enhanced with the anisotropic behavior to model the mechanical responses of soft tissues, arterial walls, and intact lumber disc bodies, etc.

2. **A coupled non-isothermal poro-elasto-plasticity model at large strains**

This research work was done with a complete framework of a model of fully coupled thermal-porous media at large strains using the Updated Lagrangian formulation. The three equations for energy balance, momentum balance and fluid mass balance, together with the reduced energy dissipation inequality, have established the thermo-poro-plasticity system. The inequality followed from the Clausius-Duhem inequality form of the second law by enforcing the balance of energy and assuming positive dissipation due to heat conduction. Darcy's law was used to relate fluid flux to pore pressure gradient. Fourier's law was used to relate heat flux to temperature gradient. On the thermomechanical side, the plastic entropy was used as an independent internal variable. Displacement (and pressure if mixed u/p formulation was used), pore pressure and temperature were employed as solution variables.

3. **Implicit stress integration procedures for the inelastic constitutive models for geological materials**

Based on the backward Euler method, stable and robust implicit stress integration procedures or return mapping techniques with calculations of the consistent tangent moduli were proposed for the complicated inelastic material models, in which the material yielding and hardening were dependent on I_1, J_2 and J_3, with some deformation parameters being stress sensitive. The algorithms have been successfully applied to the Mohr-Coulomb model and the Cam-Clay model, and implemented in ADINA software. Examples with geotechnical applications, such as tunnel excavation and dam construction, have exhibited excellent convergence performance and good global accuracy. In addition, the strain rate dependency for J_2 plasticity and the creep model LUBBY2 were successfully formulated and implemented within the framework of the implicit integration algorithm.

4. **Fully coupled analysis of the interaction between porous solids and fluids**

The porous media formulation was derived to perform the static, dynamic consolidation and undrained analyses with elastic or elasto-plastic material models for the porous solids. As an independent degree of freedom, the pore pressure was incorporated at each corner node of a solid finite element. The formulation was presented to both the displacement based and mixed displacement-pressure (u/p) based finite element methods involving incompressible or slightly compressible pore fluids. The porous solid element can be employed in conjunction with the creep material models in ADINA to study the time dependent deformation due to both the primary and secondary consolidations.

5. **The extension of the infinitesimal constitutive models to include large strains**

Based on the concept of the intermediate, stress-free configuration, the elastic and plastic deformation gradients were obtained using multiplicative decomposition. The implemented material models for geometerials (Mohr-Coulomb and Cam-Clay models) were described via the Kirchhoff stresses. The action on solids from the pore flow was described via the Kirchhoff pore fluid pressure following the generalized Darcy's law formulated with respect to the current configuration.

--- Engineering problem solving with the application of FEM for ADINA users

Various helps were provided for ADINA users to solve engineering problems associated with a wide range of FEA services including biomedical, fluid dynamics, geotechnical, structural, and thermal problems.

1. Non-linear stress analyses considering material plasticity, large deformation and frictional contact.
2. Soil-structure-water interaction.
3. 3-D Tunneling analysis.
4. Reinforced slope stability.
5. Earth dam and concrete dam.
6. Shallow and deep foundation.
7. Mechanical responses of soft tissues, arterial walls.
8. Creep analysis of concrete structures

III. University of Alberta, Canada (September 1992 – June 1998)

The following research works were undertaken to fulfill the requirements for the Ph.D. degree, and funded by the Natural Science and Engineering Research Council of Canada (NSERC). The Ph.D. study was financially supported By Dr. N. R. Morgenstern, and supervised by Dr. D. Chan and Dr. Morgenstern.

1. Numerical simulation of the propagation of shear band localization

It is presently a concern and a challenge to numerically model shear band localization. Many numerical methods have been developed to take into account the strain and displacement discontinuities across a shear band. In this work, a contact band element approach was proposed to model the propagation of shear bands with finite thickness under large shear deformation. The shear band elements, alternatively called contact band elements, were continuously updated based on their current configurations to prevent the large distortions of conventional finite elements and to maintain realistic shear band configurations. The contact band element approach, with a technique for the special shear band element, consists of the schemes to keep the shear band elements good shapes, to handle the band overlapping, kinking and separation problems. A few examples have proven that the contact band element approach is a very efficient way to model the shear band propagation under large shear deformations.

2. Kinematic modeling of shear band localization using discrete finite elements

In this research work, a framework to generate shear band elements automatically and continuously was developed. The propagating shear band was modeled using discrete shear band elements by splitting the original finite element mesh. The location or orientation of the shear band was not predetermined in the original finite element mesh. Empirical bifurcation and location criteria were proposed, which made band propagation as realistic as possible. Preliminary results from numerical simulations of biaxial tests and passive earth pressure problems have shown that the proposed framework was able to display actual patterns of shear banding in geomaterials. In the numerical examples, the occurrence of multiple shear bands in the biaxial test and the passive earth pressure problem was confirmed by field and laboratory observations.

3. **Numerical simulation of interfaces and joints subject to large shear deformations**

In this research project, an interface or joint subject to large shear deformation was simulated. Similar to the 'Arbitrary Lagrangian-Eulerian' formulation, the continuous interface elements with finite thickness used to mesh the interface were reconstructed at every load step based on the current interface configuration. Special strain expressions for the continuous interface elements were derived with regard to the characteristics of shear strain concentration along the interface. The elastic cross-isotropic model with the special Mohr-Coulomb criterion was applied for the continuous interface elements in view of the anisotropy of the interface materials. Simulation of a pullout test has shown that very large pullout displacement and realistic structure configuration can be modeled and smooth distributions of mobilized shear stresses along the interface and axial forces in the reinforcement can be obtained.

IV. Hohai University, China (August 1986 – August 1992)

1. **3-D finite analysis of Tongjiezi rock-fill dam**

Chengdu Hydroelectric Investigation and Design Institute funded this research project in the period of 1991-1992. The influence of the silty sand and gravel pool underlying the concrete-faced rock-fill dam was studied by performing 3-D nonlinear finite element analysis. The deformation and stress results were provided to modify and improve the design of the dam and the pool treatment.

2. **A study of the application of FEM to the designs of concrete dams**

This research project was granted by the National Natural Science Foundation of China from 1990 to 1992. Some empirical methodologies adopted in the concrete dam designs (gravity and arch dams) were incorporated with the finite element analyses to calculate forces, stresses. An effective way was developed to directly take results from finite element analyses for the dam designs.

3. **The risk analysis of Fuzilin buttress dam**

This research project was undertaken with the fund provided by the Electricity Department of Anhui Province from 1988 to 1989. In reviewing the safety of the Fuzilin buttress dam after the reinforcement of buttress No. 16 in 1968, the determinant and statistical models, respectively, were established based on the finite element solutions and long-term measuring data of displacement, water table, temperature and crack width. The risk analysis is carried out using the mathematical models and expert judgments. The results are used to guide the reservoir operation.

4. **The model experimental investigation of Manwuan gravity dam**

Kunmin Hydroelectric Investigation and Design Institute financially supported this research project in 1986. A plaster model experiment was conducted to obtain the circumferential stresses of the tunnels on the gravity dam and to evaluate the stability of the dam abutment, in which the strain ratio (the ratio of the strain on the prototype to the strain on the model) was not equal to 1. The reinforcements of the tunnels and dam abutment were based on the provided research results.

5. **The stability analysis of Longyangxia gravity arch dam with the mixed method of model test and numerical analysis**

At the scale of 1:200, the physical model of the complete dam-foundation system was built with barite and iron powder to keep the strain ratio near 1. The water load was

applied sequentially to get displacement measurements on the dam, along the joints, faults in the foundation. Based on the displacement results on different load steps, stresses and strains throughout the dam and foundation were obtained using the inverse analysis of FEM. The dam was eventually overloaded to failure to get the bearing capacity. A safety control scheme and reinforcement plan was proposed for the dam and reservoir operation. The Ministry of Water Resources of China funded this research project in the period of 1987-1989.

6. **Operational evaluation of Xianghongdian arch dam**

Consulting work was done for the research engineers of Xianghongdian Hydro-elctric Power to establish the database for the long-term measurements with software dBASE III, and to develop statistical and determinant models for risk assessments and analyses for the dam by incorporating the finite element solutions.

Consulting Experience

1. A survey for effective ways to estimate pile setup in different states/provinces (November 2008 –April 2009)

As a part of work of the research project funded by Louisiana Transportation Research Center, a pile setup survey was conducted by sending a pile setup questionnaire to all the states in the United States and provinces in Canada. It turned out that a total of 36 states/provinces sent their responses. Most of the responded states/provinces think that pile setup is an important factor, and some of them have considered pile setup effect to some extents in their pile foundation design. However, no states/provinces have considered pile setup effect beyond two weeks after end of driving. They have not thoroughly taken into account pile setup effect mainly because currently there is not a well-developed mathematical model available for setup prediction. All the completed surveys have been summarized and presented in the final research report.

2. Data collection and evaluation of subsurface exploration and embankment safety analysis (July 2008)

Hired by Dean Dick Engineering, INC, Boring/CPT logs within the city limit of Ruston, Louisiana, were collected, analyzed, and subsurface information were prepared subsequently for the site of the embankment to be designed and constructed by the company. Based on the subsurface information acquired, the safety of the embankment in its preliminary design stage was evaluated using computer software.

II. University of Alberta (Teaching Assistant)

Lectured labs, ran tutorials, and advised students for the following courses:

- Civ E 130 ‘Engineering Mechanics’
- Civ E 265 ‘Engineering Drawing and Computer Graphics’
- Civ E 295 ‘Application of Numerical Methods to Civil Engineering Problems’
- Civ E 381 ‘Soil Mechanics’
- Civ E 398 ‘Introduction to Solid Mechanics’ (undergraduate students)
- Civ E 664 ‘Introduction to Solid Mechanics’ (graduate students)

III. Hohai University (Lecturer and Assistant Lecturer)

1. Lectured the following courses:
   - 'Structures of Hydraulic Engineering'
   - 'Soil Mechanics'
   - 'Mechanics of Materials'
   - 'The application of the finite element method to hydraulic structures'
2. Supervised 12 undergraduate students for their final year design projects, co-supervised 3 master's students

Directed Student Learning

- Master's Thesis/PhD Committee Chair, CVEN. (September 01, 2022 -), Abhishek Tiwari
- PhD Dissertation Committee Chair, CVEN. (June 01, 2019 –), Omar Apu
- Master's Thesis Committee Chair, CVEN. (June 01, 2019 –August 31, 2022), Omar Shahrear Apu
- PhD Dissertation Committee Chair, CVEN. (September 01, 2017 – November 30, 2021), Debojit Sakar
- Master's Thesis Committee Chair, CVEN. (June 01, 2015 – August 31, 2018), Sujan Baral
- PhD Dissertation Committee Chair, CVEN. (March 01, 2012 – February 28, 2017), Adnan Khan
- PhD Dissertation Committee Chair, CVEN. (March 01, 2013 – May 18, 2017), Minhaz Shahriar
- Master's Thesis Committee Chair, CVEN. (September 01, 2014 – May 18, 2017), Berjees Ikra
- Master's Thesis Committee Chair, CVEN. (June 01, 2011 – November 15, 2014), Minhaz Shahriar
- Master's Thesis Committee Chair, CVEN. (March 01, 2012 – August 31, 2014), Adnan Khan
- Master's Thesis Committee Chair, CVEN. (September 8, 2010 – November 18, 2013), Shi He
- PhD Dissertation Committee Chair, CVEN. (May 1, 2008 - August 30, 2011), Eric Steward
- Master's Thesis Committee Chair, CVEN. (March 1, 2009 - June 20, 2010), Neha Verma
- Dissertation Committee Chair, "PhD dissertation research," CVEN, (January 1, 2006 - May 31, 2009), Shouxin Wu
- PhD Defense committee member, CVEN, (April 18, 2023), Jash Dhabi
- PhD Defense committee member, CVEN, (March 31, 2023), John Kraft
- PhD comprehensive oral exam committee member, CVEN. (August 19, 2022), Yash Dhabi
- PhD comprehensive oral exam committee member, CVEN. (June 22, 2022), John Kraft
- PhD Defense committee member, CVEN. (April 1, 2022), Oluwatobi F. Babarinde
- PhD Defense committee member, CVEN. (June 28, 2021), Roksana Hossain
- PhD Defense committee member, CVEN. (January 29, 2021), Dinesha Kuruppuarachchi

- PhD Defense committee member, CVEN. (June 29, 2020), Md Shams Arafat
- PhD comprehensive oral Examination Committee Member, CVEN. (January 31, 2020), Roksana Hossian.
- PhD Defense committee member, CVEN. (November 07, 2019), Hongfang Lu
- PhD Defense committee member, MEEN. (June 10, 2019), Xi Xie
- Master Thesis Defense Committee Member, CVEN. (April 02, 2019), Ashlesh Banjara.
- PhD comprehensive oral exam committee member, CVEN. (April 01, 2019), Md Shams Arafat
- Master Thesis Defense Committee Member, CVEN. (January 13, 2018), Waleed Omer
- PhD Preliminary Oral Examination Committee Member, MEEN. (November 16, 2017), Xi Xie
- Master Practicum Defense Committee Member, MEEN. (November 06, 2017), Denial Sumy
- Master Practicum Defense Committee Member, MEEN. (July 14, 2017), Mohammad Imrul Kayes
- Dissertation Defense Committee Chair, CVEN. (April 07, 2017), Minhaz M. Shahriar
- Master Thesis Defense Committee Chair, CVEN. (March 29, 2017), Berjees Ikra
- Master Thesis Defense Committee Member, CVEN. (January 5, 2017), Hang Zhang
- Master Thesis Defense Committee Member, CVEN. (January 5, 2017), Yu Yan
- Dissertation Defense Committee Chair, CVEN. (December 09, 2016), Adnan Khan
- Dissertation Defense Committee Member, CVEN. (May 10, 2016), Xuanchen Yan
- Dissertation Defense Committee Member, CVEN. (February 26, 2016), M. Readul Islam.
- Master's Thesis Defense Committee Member, CVEN. (November 12, 2015), Yibo Chen.
- Master's Thesis Defense Committee Member, CVEN. (September, 2015), Jorge Arroyo-Esqueda
- Dissertation Defense Committee Member, CVEN. (February 27, 2015), Nibert Saltibus
- Dissertation Defense Committee Member, MEEN. (September 19, 2014), Konstantin Dolgan
- Master's Thesis Defense Committee Member, CVEN. (July 2014), Yu Yan
- Master's Thesis Defense Committee Member, CVEN. (September 27, 2013), Saeid Ashani
- Master's Thesis Defense Committee Member, CVEN. (June 14, 2013), Milap Dhakal
- Master's Thesis Defense Committee Member, CVEN. (March 14, 2013), Kisler Wilson
- Master's Thesis Defense Committee Member, CVEN. (December 14, 2012), MD Kamrul Hassan
- Master's Thesis Defense Committee Member, CVEN. (December 13, 2012), Mir Abdullah Al-Masud
- Dissertation Defense Committee Member, CVEN. (November 2, 2012), Rajan Saha
- Dissertation Defense Committee Member, CVEN. (January 12, 2012), Yang Gao
- Dissertation Defense Committee Member, CVEN. (October, 2011), Shaurav Alam
- Dissertation Defense Committee Member, CVEN. (July, 2011), Chengguang Yang
- Dissertation Defense Committee Member, CVEN. (March 26, 2010), Carlos Monts
- Dissertation Defense Committee Member, CVEN. (March 17, 2010), Ashok Aleti
- Dissertation Defense Committee Member. CVEN. (February 2010), John Matthews
- Master's Thesis Committee Member, CMEN. (January 10, 2010), MD. Ashraful Alam

- Master's Thesis Committee Member, CVEN. (November 12, 2009), Prashant Arasanagi
- Undergraduate Research, "Setup study of driven piles," CVEN. (October 1, 2008 - May 31, 2009), Mitchell Mosher
- Directed Individual/Independent Study, "Elasto-Plasticity and Models for Metal Materials," MEEN, (November 2008 - March 2009), Priyank Subhedar
- Directed Individual/Independent Study, "Study of the soil aging effect of pile setup," CVEN, (September 2008 - January 2009), Eric Steward
- Master's Thesis Committee Chair. (September 1, 2008 - November 26, 2008), Ghanendra Mishra
- Master's Thesis Committee Chair, CVEN. (September 1, 2008 - November 26, 2008), Govinda agrawal
- Master's Thesis Committee Member, CVEN, (September 2008), Ajay Mothukuri
- Dissertation Defense Committee Member. (June 2008), Kiran Katkuri
- Master's Thesis Committee Member. (December 2007), Vishwajeet Ahuja (thesis defense committee member)
- Master's Thesis Committee Member, MEEN, (November 2007), Joseph Berchmans
- Dissertation Committee Member, CVEN, (November 10, 2007), Xiang Zhou (Dissertation defense Committee Member)
- Dissertation Committee Member, CVEN, (May 2006), Shanhai Guan
- Dissertation Committee Member, MEEN, (May 2005), Qin (Sean) Cai
- Dissertation Committee Member, CVEN, (May 2004), Feibai Ma

Presentations Given

- Wang, Jay X. 2017 Invited lecture, "Studies on the Failure Mechanism of the Breached Levee System at the 17th Street Canal, New Orleans", June 20, 2017, China Three Georges University, Yichang, Hubei Province, China.
- Wang, Jay X. 2017 International Conference on Transportation Infrastructure and Materials, Invited lecture, "Development of a mechanistic-based design method for geosynthetic-reinforced pavement on expansive soils", June 10, 2017, Qingdao, China.
- Wang, Jay X. 2016 2nd Region 6 Transportation-Climate Summit, "Impact of Severe Drought on the Compacted Expansive Clays (Subgrade) in Northern Louisiana", South Plains Transportation Center (SPTC) and the South Central – Climate Science Center (SC-CSC), November 14, 2016, Norman, Oklahoma.
- Wang, Jay X. 2016 Trenchless Technology Center IAB meeting, Louisiana Tech University, "Research of Long-Term Earth Pressure on Manhole for Rehabilitation Design", October 26, 2015, Ruston, Louisiana.
- Wang, Jay X. 2016 2016 Louisiana Transportation Conference, "Characterization of Expansive Soils in Northern Louisiana", February 28 – March 02, 2016, Baton Rouge, Louisiana.
- Wang, Jay X. 2016 Presentation for T.L. James Chair Professor application, Louisiana Tech University, "Study on the Failure Mechanism of the Breached Levee System at the 17th Street Canal, New Orleans", January 13, 2016, Ruston, Louisiana.

- Wang, Jay X. 2015 Trenchless Technology Center IAB meeting, Louisiana Tech University, “Expansive soils and practice in infrastructure engineering”, October 22, 2015, Ruston, Louisiana.
- Wang, Jay X. 2015 Monthly meeting, Invited by Shreveport Chapter of Louisiana Engineering Society, “Expansive soils and practice in foundation engineering”, May 13, 2015, Shreveport, Louisiana.
- Wang, Jay X. 2013 Annual Louisiana ASCE Conference, invited presentation, “Levee Breach at the 17th Street Canal in New Orleans due to Hurricane Katrina”, April 18-19, 2013, Shreveport, Louisiana.
- Wang, Jay X. 2013 17th Joint Engineering Societies Conference, invited presentation, “Pile Set-up: Capacity Growth with Time—From Observation to Formulation”, January 23-24, 2013, Lafayette, Louisiana.
- Wang, Jay X. 2012 Continuing Professional Development Seminar, invited presentation, “Fundamentals of Pile-Set-up”, October 18, 2012, Shreveport, Louisiana.
- Wang, X. 7th International Bridge Engineering Conference, “A Study of Pile Setup-South Louisiana Clayey Soils”, San Antonio, Texas (December 1, 2010).
- Wang, X. Zhejiang University, "Studies on Levee failures due to Hurricane Katrina," Research Institute of Natural Disasters prevention, Hangzhou, China (July 9, 2010).
- Wang, X. Tongji University, "Studies on Levee failures due to Hurricane Katrina," Hydraulic Engineering Department, Shanghai, China (July 4, 2010).
- Wang, X. Shanghai University, "Studies on Levee failures due to Hurricane Katrina," Department of Civil Engineering, Shanghai, China (July 2, 2010).
- Wang, X. (Presenter Only), the 35th Southwest Geotechnical Engineering Conference, "capacity growth and its prediction for piles driven in Louisiana Soils (invited by LTRC)," LTRC, LADOTD and LSU, Baton Rouge (April 26, 2010).
- Wang, X. Geo Florida 2010, "Setup Prediction of Piles Driven into Louisiana Soft Clays," Geo-Institute, ASCE, West Palm Beach, Florida (February 21, 2010).
- Wang, X. Presentation of the final report of the pile setup research project to the PRC, "Estimating of setup of piles driven into Louisiana clayey soils," LTRC, Baton Rouge, LA (January 2010).
- Wang, X. Presentation of the final research report (1), "Prediction of setup of piles driven in Louisiana Clayey Soils," LTRC, Baton Rouge (October 15, 2009).
- Wang, X. (Presenter & Author), “Study of the Soil-Structure-Pore Water Interaction of the Breached Levee System at the 17th Street Canal of New Orleans,” The 2009 ASME-ASCE-SES Conference on Mechanics and Materials, ASCE, ASME, and SES, Blacksburg, VA (June 26, 2009).
- Wang, X. Louisiana Transportation Conference, "Failure analysis of the breached levee at the 17th street canal in New Orleans due to Hurricane Katrina," LTRC and DOTD, Baton Rouge (February 2009).
- Wang, X. Louisiana Transportation Conference, "The long term setup of driven piles in Louisiana clayey soils," LTRC and DOTD, Baton Rouge (February 2009).
- Wang, X. Geotechnical and Pavement Research Problem Identification Committee (RPIC), "Review and Prioritize the problem statements," LTRC, Baton Rouge (January 2009).

- Wang, X. Staged report on the research of "Estimating the setup of driven pile into Louisiana Clayey soils", "Preliminary results on the pile setup study," LTRC, Baton Rouge (November 15, 2008).
- Wang, X. (Presenter Only), LTRC proposal presentation, "A brief introduction to the proposed pile setup research," LTRC, Baton Rouge (March 13, 2008).
- Saber, A. (Presenter & Author), Wang, X. Meeting at LTRC about the Twin-Span bridge monitoring, "Field monitoring of the integral pile system of the I-10 twin span bridge over Lake Pontchartrain," LTRC, Baton Rouge (July, 2007).
- Wang, X. The Fourth MIT conference on Computational Fluid and Solid Mechanics--Focus: Fluid-Structure Interactions, "Dynamic analysis of a water–soil–pore water coupling system," MIT, MIT, Cambridge, MA (June 13, 2007).
- Wang, X. The 18th Engineering Mechanics Division Conference of the ASCE, "An introduction to the stress integration algorithm for the j3-dependent soil models," ASCE/EMI, Blacksburg, VA (June 3, 2007).
- Wang, X. (Author Only), Sterling, R. L. (Presenter & Author), 24th International NO-DIG 2006 Conference and Exhibition, "Finite element analysis of the instability of borehole wall during," The International Society for Trenchless Technology, Queensland, Australia (November 1, 2006).
- Wang, X. (Presenter & Author), 15th U.S. National Congress on Theoretical and Applied Mechanics, "Continuous shear band Elements Subject to Large Shear Deformations," ASCE and ASME, Boulder, Colorado (June 27, 2006).
- Wang, X. (Presenter & Author), The 2005 Joint ASCE/ASME/SES Conference on Mechanics and Materials, McMat 2005, “Numerical modeling of strain localization”, Baton Rouge, Louisiana (June 2, 2005).
- X. Wang, the Third Biot Conference on Poromechanics, “Dynamic analysis of a water-soil-pore water coupling system”, Norman, Oklahoma (May 26, 2005).
- X. Wang, NO-DIG 2004, NASTT, “Stability analysis of a borehole wall in horizontal directional drilling”, New Orleans, Louisiana (March 23, 2004).

Professional Development

i) Geosynthetics Education Training Program. Educate the Educators, Austin, TX, hosted by North American Geosynthetics Society, July 28 – 29, 2015.
ii) ABET symposium on how to prepare self-study report for ABET evaluation, organized by ABET, Portland, OR, April 12 -- 13, 2013.
iii) University Professors’ Program, sponsored and organized by ArcelorMittal and Skylinesteel I, San Francisco, CA, March 22 – 23, 2012.
iv) 5th Biennial Professors’ Driven Pile Institute, sponsored and organized by Pile Driving Contractors Association (PDCA), Utah State University, Logan, UT, June 15 – 19, 2009.
v) 2008 Foundation Engineering Faculty Workshop, sponsored and organized by the ADSC: The international Association of Foundation Drilling, Chattanooga, TN, June 8 – 14, 2008.

Service

I. Service to Profession

i) Service to Journal

- Editorial Board Member, Journal of Tunnelling and Underground Space Technology.

ii) Service to professional organizations

- Executive member, ASCE **Transportation and Development Institute**, Louisiana Chapter;
- Member, Committee of **Modeling Inelasticity and Multiscale Behavior**, Engineering Mechanics Institute, ASCE;
- Member, Committee of **Computational Geotechnics**, Geo-Institute, ASCE.

iii) Service as panel member on State/Federal/Private funding agency programs

- Panelist, Program of Civil, Mechanical and Manufacturing Innovation, National Science Foundation
- Mail-reviewer, Program of Civil, Mechanical and Manufacturing Innovation, National Science Foundation
- Member, Research Problem Identification Committees (RPICs), LTRC

iv) Service to academic conferences

Chairperson, the 1st MIT and 4th MIT conferences on Computational Fluid and Solid Mechanics

v) Service to research collaborator

Invited to teach short course titled "Stress Integration Using the Return Mapping Algorithm" at Department of Civil and Environmental Engineering, Virginia Tech, 06/28/2009

vi) Service as a reviewer for professional journals, conferences or proposals

1. Petroleum Science (Springer)
2. International Journal of Computers and Structures (Elsevier)
3. Computer Methods in Applied Mechanics and Engineering
4. Tunnelling and Underground Space Technology ((Elsevier)
5. International Journal of Solids and Structures
6. The ASCE Journal of Engineering Mechanics
7. The ASCE Journal of Geotechnical and Geoenvironmental Engineering (JGGE)
8. The ASCE Journal of Nanomechanics and Micromechanics
9. The Canadian Geotechnical Journal
10. The International Journal of Geotechnical and Geological Engineering (GEGE)
11. Engineering Structures (Elsevier)
12. Journal of Testing and Evaluation (ASTM International)
13. International Journal of Numerical and Analytical Methods in Geomechanics (John Wiley & Sons)
14. Mathematical Problems in Engineering
15. South Plain Transportation Center
16. Chinese Oversea Transportation Association
17. Geo-Shanghai
18. Geo-Hunan
19. Annual Geo-Congress (ASCE)
20. Sustainable Civil Infrastructures

21. Book review: "The Engineering of Foundations" by Rodrigo Salgado, McGraw-Hill, 2006; "Geotechnical Engineering: Principles and Practices", Second Edition, by Donald P. Coduto, Prentice Hall, 2008

II. Service to the Civil Engineering Program

i) Program Chair
ii) Student Advisor (Around 35 undergraduate students each year)
iii) Coordinator of the Civil Engineering PhD program

III. Service to the College of Engineering and Science

i) Chair, selection committee of 2016 Engineering Faculty Professionalism Award Recipient, 11/30 - 12/7/2015
ii) Member, search committee to recruit Dean of the College of Engineering and Science: 09/2013 – 06/2014
iii) Member, search committee to recruit a structural faculty member for Civil Engineering Program, 09/2013 – 06/2014
iv) Committee to Review Minors in Engineering: March 01, 2011 – March 31, 2011
v) College strategic plan team: KSD2: 2003--2004

IV. Service to the University

i) University Senate: Senator: 2006-2009
ii) University Senate: Executive Senator: 2008-2009

Membership

i. Registered Civil Engineer, Louisiana Professional Engineering and Land Surveying Board (LAPELS)
ii. Member, American Society of Civil Engineers (ASCE)
iii. Member, Association of Drilled Shaft Contractors (ADSC)
iv. Member, Pile Driving Contractors Association (PDCA)