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Research Areas

Professor Sun's field of research is computational mechanics, with a focus on material modeling of geological, energetic, granular, porous, and multi-phase solids with enhanced/enabled by machine learning. His research group specializes in the formulation, derivation, implementation, verification and validation of theoretical, computational, data-driven, and machine learning inverse and forward problems for sustainable engineering applications.

Education

PhD. Theoretical and Applied Mechanics, Northwestern University, 09/2008-06/2011

M.A. Civil Engineering, Princeton University, 06/2007-05/2008

M.S. Civil Engineering (Geomechanics), Stanford University, 09/2005-06/2007

B.S. Civil Engineering,University of California, Davis, 09/2002-06/2005

Work Experience

Associate Professor (with tenure), Department of Civil Engineering and Engineering Mechanics, Columbia University, since 07/2020

Editor, International Journal for Numerical Methods in Engineering, Wiley, since 04/2025

UPS Foundation Visiting Professor, Department of Civil and Environmental Engineering, Stanford University, 08/2022-08/2023

Assistant Professor , Department of Civil Engineering and Engineering Mechanics, Columbia University, 01/2014-07/2020

Senior Member of Technical Staff, Mechanics of Materials, Sandia National Laboratories (Livermore), 12/2012-01/2014

Postdoctoral Appointee, Mechanics of Materials, Sandia National Laboratories (Livermore), 06/2011-12/2012

Visiting Scholar, California Institute of Technology, 09/2010-12/2011

Honors and Awards

Selected individual awards received by the PI (Post-tenure)

- **Walter L. Huber Civil Engineering Research Prize**, American Society of Civil Engineers, 2023. In July 1946, the Board of Direction authorized annual awards on recommendation by the Society's Committee on Research to stimulate research in civil engineering. In October 1964, Mrs. Alberta Reed Huber endowed these prizes in honor of her husband, Walter L. Huber, Past President, ASCE.
- **UPS Foundation Visiting Professorship**, Stanford University (Fall 2022 to Spring 2023). The UPS Foundation Visiting Professorship is made possible by UPS Foundation to invite a leading scholar annually in a selected field related to Civil Engineering to be in residence at Stanford for research interaction with faculty and students in the area of their specialty.
- **John Argyris Award for Young Scientists**, the International Association for Computational Mechanics, 2020. The IACM recognizes outstanding accomplishments, particularly outstanding published papers, by researchers 40 or younger. Eligibility requires that the nominee not turn 41 in the year the award is presented. The IACM John Argyris Award for Young Scientists is sponsored by Elsevier to honor Professor John Argyris' significant contributions in the field.

Selected individual awards received by the PI (Pre-tenure)

- **NSF CAREER Award**, National Science Foundation (Mechanics of Materials and Structures Program, Civil, Mechanics and Manufacturing Innovation Division), 2019. The NSF's most prestigious award in support of junior faculty who exemplify the role of teacher-scholar through outstanding research and excellent education.
- **EMI Leonardo Da Vinci Award**, the Engineering Mechanics Institute of American Society of Civil Engineers, 2018. The purpose of the award is to recognize outstanding young investigators early in their careers for promising ground-breaking developments in the field of Engineering Mechanics and Mechanical Sciences as relevant to Civil Engineering, understood in the broadest sense. The award is given annually to a young investigator, generally under 35 years of age or have worked no more than 7 years since receiving their doctoral degree, and whose contributions have the promise to define new directions in theory and application of Engineering Mechanics, in the vein of Leonardo da Vinci (1452-1519), a man of unquenchable curiosity and feverishly inventive imagination. The EMI of ASCE selected the PI "*for his fundamental contributions to computational multiscale poromechanics*".
- **Zienkiewicz Numerical Methods in Engineering Prize**, Institution of Civil Engineers (ICE) and John Wiley & Sons, 2017. Instituted following a donation by John

Wiley & Sons Ltd to commemorate the work of Professor Olgierd Cecil Zienkiewicz CBE. DSc FRS FREng of the Institute for Numerical Methods in Engineering, University of Wales, Swansea. The medal is awarded biennially by the Institution of Civil Engineers (ICE) to a researcher under 40 for the paper which contributes most to research in numerical methods in engineering, among 8 prime peer-reviewed journals published by ICE or Wiley, i.e., Géothechnique, Géothechnique Letters, International Journal for Numerical Methods in Engineering, International Journal for Numerical Methods in Biomedical Engineering, International Journal for Numerical Methods in Fluids, International Journal for Numerical and Analytical Methods in Geomechanics, International Journal of Numerical Modelling: Electronic Networks, Devices and Fields, and ICE Proceedings.

- **AFOSR Young Investigator Program Award**, Air Force Office of Scientific Research, US Air Force, 2017. The Air Force's Young Investigator Program (YIP) award is one of the most prestigious honors bestowed by the US Air Force to outstanding scientists beginning their independent careers. The program is designed to identify and support talented scientists and engineers who show exceptional promise for doing creative research in order to encourage their teaching and research careers.
- **ARO Young Investigator Program Award**, Army Research Office, US Army, 2015. The Army's Young Investigator Program (YIP) award is one of the most prestigious honors bestowed by the US Army to outstanding scientists beginning their independent careers. The program is designed to identify and support talented scientists and engineers who show exceptional promise for doing creative research in order to encourage their teaching and research careers.
- **Caterpillar Best Paper Prize**, Springer-Verlag Berlin Heidelberg, 2013. Selected annually among all journal articles published in *Acta Geotechnica* in 2013. Previous awardees include Yannis Dafalias (2014) and Franz-Josef Ulm (2012).

Other individual awards received by the PI

- **Dresden Fellowship**, Technische Universität Dresden, Germany, 2016.
- **Recognition Award** for contribution to Albany Project, Sandia National Laboratories, Department of Energy, 2016.
- **DURIP Award**, United States Department of Defense and Army Research Office, 2015.
- **Claude R. Hocott Lectureship**, Department of Petroleum and Geosystem Engineering, the University of Texas at Austin, 2015.
- **Provost Diversity Award**, Provost's Office, Columbia University, 2015.
- **Visiting Professorship**, Technische Universität Dresden, Germany, 2015, 2016 and 2017.
- **Visiting Professorship**, University of Perugia, Italy, 2015.

- **Visiting Professorship**, Chinese University of Hong Kong, Hong Kong, 2014, 2015.
- **IUTAM Travel Fellowship**, selected as one of the six young investigators to present at IUTAM symposium on "Connecting Multiscale Mechanics to Complex Material Design", International Union of Theoretical and Applied Mechanics, 2014.
- **USNCTAM Travel Fellowship**, 16th US National Congress of Theoretical & Applied Mechanics, 2010
- **USACM Travel Fellowship**, 9th World Congress of Computational Mechanics, 2010
- **NSF Travel Fellowship**, International Workshop on Multiscale and Multiphysics Processes in Geomechanics, 2010
- **Tuition Scholarship**, Summer School on Accelerators for Science and Engineering, National Science Foundation, 2008
- **Graduate Fellowship**, Northwestern University, 2008
- **Graduate Fellowship**, Princeton University, 2007
- **Graduate Fellowship**, Stanford University, 2005
- **John W. and Ernestine L. Heinrich Scholarship**, University of California, Davis, 2004
- **American Public Works Associations Scholarship**, American Public Works Associations, 2004
- **PEER Scholarship**, Pacific Earthquake Engineering Research Center, 2004
- **MORE Undergraduate Research Fellowship**, University of California, Davis, 2004

Awards received by PI's students and group Members

- **Harold Agnew National Security Postdoctoral Fellowship** (Eric Bryant), Los Alamos National Laboratory, 2021.
- **Department of Defense Science, Mathematics and Research for Transformation (SMART) scholarship** (Nhon Ngoc Phan), US Department of Defense, 2021.
- **Department of Defense National Defense Science and Engineering Fellowship (NDSEG)** (Jarett Poliner), US Department of Defense, 2020.
- **Mindlin award** (SeonHong Na, Kun Wang, Nikolaos Vlassis, Bahador Bahmani), Fu Foundation School of Engineering and Applied Science, Columbia University, 2018, 2019, 2021 & 2024.
- **NSF Conference Fellowship** (Nikolaos Vlassis, Bahador Bahmani, Zeyu Xiong, Ran Ma, Qing Yin and Jarett Poliner), Mechanistic Machine Learning and Digital Twins for Computational Science, Engineering & Technology, MMLDT-CSET, San Diego, registration waiver, 2021.

- **NSF Conference Fellowship** (Nikolaos Vlassis, Bahador Bahmani), 16th U.S. National Congress on Computational Mechanics, registration waiver, 2021.
- **Travel Scholarship** (Kun Wang and Chuanqi Liu), Workshop on Meshfree and Particle MEthods: Applicatiopn and Theory, Santa Fe, 2018.
- **Travel Scholarship** (Eric Bryant), 3rd Biennial CO2 for EOR as CCUS conference, Petroleum Research School of Norway, 2017.
- **Dongju Lee Memorial Award** (SeonHong Na), Columbia University, 2017.
- **Travel Scholarship** (SeonHong Na), US National Congress of Computational Mechanics, Montreal, Canada, 2017.
- **Teaching Assistant Award** (SeonHong Na), Columbia University (Soil MEchanics), 2017.
- **2nd Place in Best Paper Student Competition** (SeonHong Na), Engineering Mechanics Institute, Modeling Inelasticity and Multiscale Behavior Committee, EMI 2016 & PMC 2016, Vanderbilt University, Nashville, TN, 2016.
- **Best Poster Presentation Award** (Yang Liu), US National Congress of Computational Mechanics, San Diego, CA, 2015.
- **Travel Scholarship** (Kun Wang), Society of Engineering Science Meeting at Texas A&M University, 2015.
- **Travel Scholarship** (Yang Liu), US National Congress of Computational Mechanics, San Diego, CA, 2015.
- **Travel Scholarship** (SeonHong Na), Engineering Mechanics Institute Conference, Stanford, 2015.
- **Travel Scholarship** (SeonHong Na), deal.ii Workshop, Texas A&M University, 2015.

Journal Articles

($*$ indicates current or former students, $\star$ indicates postdocs, † indicates visiting scholars. First author credited to author who contributed the most except the most senior author; the senior author listed as the last author regardless of her/his contribution. Total citation = 5,854 (2,145 at the time of tenure in 2020); H-index= 44; i10-index=95 (Google scholar [URL]) as of 9/26/2025.)

1. R.I. Borja and **W.C. Sun**, Estimating inelastic sediment deformation from local site response simulations, *Acta Geotechnica*, 2(3):183-195, 2007 [URL].
2. R.I. Borja and **W.C. Sun**, Co-seismic sediment deformation during the 1989 Loma Prieta Earthquake, *Journal of Geophysical Research*, Vol.113, B08314,`doi:10.1029/2007JB005265`, 2008. [URL]
3. **W.C Sun**, J.E. Andrade, J.W. Rudnicki, A multiscale method for characterization of porous microstructures and their impact on macroscopic effective permeability, *International Journal for Numerical Methods in Engineering*, 88(12), 1260-1279, `doi:10.1002/nme.3220`, 2011. [URL]

4. **W.C. Sun**, J.E. Andrade, J.W. Rudnicki and P. Eichhubl, Connecting microstructural attributes and permeability from 3-D tomographic images of in situ compaction bands using multi-scale computation, *Geophysical Research Letter*, doi:10.1029/2011GL047683, 2011. (featured in EARTH magazine September 2011 issue [LINK])[URL]

5. **W.C. Sun** , An unified method to predict diffuse and localized instabilities in sands, *Geomechanics and Geoengineering*, 8(2):65-75 doi:10.1080/17486025.2012.695403, 2013 [URL].

6. **W.C. Sun**, J.T. Ostien and A.G. Salinger, A stabilized assumed deformation gradient finite element formulation for strongly coupled poromechanical simulations at finite strain, 37(6):2755-2788, doi:10.1002/nag.2161, *International Journal for Numerical and Analytical Methods in Geomechanics*, 2013. [URL]

7. **W.C. Sun**, M.R. Kuhn and J.W.Rudnicki, A multiscale DEM-LBM analysis on permeability evolutions inside a dilatant shear band, *Acta Geotechnica*, 8(5):465-480 doi:10.1007/s11440-013-0210-2, 2013 [URL] (Caterpillar Best Paper Prize in the year of 2013).

8. A. Mota, **W.C. Sun**, J.T.Ostein, J.W. Foulk III and K.N. Long, Lie-Group interpolation and variational recovery for internal variables, *Computational Mechanics*, 52(6):1281-1299, 2013. [URL]

9. **W.C. Sun**, Q. Chen and J.T. Ostien, Modeling hydro-mechanical responses of strip and circular footings on saturated collapsible geomaterials, *Acta Geotechnica*, 9(5):903-934, 2014. [URL].

10. **W.C. Sun** and A. Mota, A large deformation multiscale overlapped coupling formulation for strain localization, *Computational Mechanics*, 54(3):803-820, doi:10.1007/s00466-014-1034-0, 2014.[URL]

11. **W.C. Sun**, A stabilized finite element formulation for monolithic thermo-hydro-mechanical simulations at finite strain, *International Journal for Numerical Methods in Engineering*, 103(11):798-839, doi:10.1002/nme.4910, 2015. [URL]. (This paper is one of the 5 most cited papers from 2015 to 2016 in IJNME [URL] .)

12. M.R. Kuhn, **W.C. Sun**, Q. Wang*, Stress-induced anistropy in granular materials, fabric, stiffness and permeability, *Acta Geotechnica*, 10(4):399-419, doi:10.1007/s11440-015-0397-5, 2015. [URL]

13. K. Wang* and **W.C. Sun**, Anisotropy of a tensorial Bishop coefficient under suction-controlled triaxial loadings, *ASCE Journal of Engineering Mechanics*, doi:10.1061/(ASCE)EM.1943-7889.0001005, 2015. [URL]

14. Y. Liu*, **W.C. Sun**, J. Fish, Parameter identification for critical state plasticity models based on multilevel extended digital database, *Journal of Applied Mechanics*, 83(1), 011003, 2015. [URL]

15. Y. Liu*, **W.C. Sun**, Z. Yuan, J. Fish,A nonlocal multiscale discrete-continuum model for predicting mechanical behavior of granular materials, *International Journal for Numerical Methods in Engineering*, 106(2):129-160, doi:10.1002/nme.5139, 2016. (PhD Student Yang Liu won 2015 best poster competition at USNCCM San Diego). [URL]

16. N. Guo, J. Zhao, **W.C. Sun**, Multiscale analysis of shear failure of thick-walled hollow cylinder in dry sand, *Geotechnqiue Letters*, 6(1):77-82, 2016. [URL]

17. S. Na*, **W.C. Sun**, Wave propagation and strain localization in a fully saturated softening porous medium under the non-isothermal conditions, *International Journal for Numerical and Analytical Methods in Geomechanics*, 40(10):1485-1510, doi:10.1002/nag.2505, 2016. [URL]

18. Z. Zheng†, **W.C. Sun**, J. Fish, Micropolar effect on the cataclastic flow and brittle-ductile transition in high-porosity rocks, *Journal of Geophysical Research: Solid Earth*, doi:10.1002/2015JB012179, 2016.

19. K. Wang*, **W.C. Sun**, A semi-implicit discrete-continuum coupling method for porous media based on the effective stress principle at finite strain, *Computer Methods in Applied Mechanics and Engineering*, 304(1):546-583, doi:10.1002/nag.2505, 2016. [URL]

20. K. Wang*,**W.C. Sun**, S. Salanger, S. Na*, G. Khaddour, Identifying micropolar material parameters via micro-CT images, *International Journal of Multiscale Computational Engineering*, 14(4): 389–413, doi:10.1615/IntJMultCompEng.2016016841, 2016. [URL]

21. A.G. Salinger, R.P. Pawlowski, Eric T. Phipps, R.A. Bartlett, G.A. Hansen, I. Kalashnikova, J.T. Ostien, **W.C. Sun**, Q. Chen, A. Mota, R.A. Muller, E. Nielsen, X. Gao. Albany: A component-based partial differential equation code build on Trilinos, *International Journal for Multiscale Computational Engineering*, doi:10.1615/IntJMultCompEng.2016017040, 2016. [URL]

22. **W.C. Sun**, Foreword: Computational Poromechanics, *International Journal of Multiscale Computational Engineering*, doi:10/.1615/IntJMultCompEng.2016018596, 2016.

23. **W.C. Sun**, Z. Cai*, J. Choo⋆, Mixed Arlequin method for multiscale poromechanics problems, *International Journal for Numerical Methods in Engineering*, 111:624-659 doi:10.1002/nme.5614, 2017. [URL]

24. K. Wang*, **W.C. Sun**, A unified variational framework for modeling fractures and compaction bands in brittle fluid-infiltrating porous media, Computer Methods in Applied Mechanics and Engineering, 318:1-32 doi:10.1016/j.cma.2017.01.017, 2017. [URL] (This paper is among the most downloaded articles in CMAME [URL] .)

25. S. Na*, **W.C. Sun**, Computational thermo-hydro-mechanics for multiphase freezing and thawing porous media in the finite deformation range, *Computer Methods in Applied Mechanics and Engineering*, 318:667-700, doi:10.1016/j.cma.2017.01.028, 2017. (Student selected as runner-up for the 2017 best paper competition at EMI Nashville). [URL]

26. I. Wollny, **W.C. Sun**, M. Kaliske, A hierarchical sequential ALE poromechanics model for tire-water-road interaction on fluid-infiltrating roads, *International Journal of Numerical Methods in Engineering*, doi:10.1002/nme.5537, 2017. [URL]

27. S. Na*, **W.C. Sun**, H. Yoon, M. Ingraham, Effects of elastic heterogeneity on the fracture pattern and macroscopic effective toughness of Mancos Shale in Brazilian tests, *Journal of Geophysical Research: Solid Earth*, doi:10.1002/2016JB013374, 2017. [URL]

28. H. Xin†, **W.C. Sun**, J. Fish, a surrogate modeling approach for additive-manufactured materials, *International Journal of Multiscale Computational Engineering*, accepted, 2017.

29. H. Xin†, **W.C. Sun**, J. Fish, Thermo-mechanical discrete element simulations on Powder-Bed Sintering-based Additive Manufacturing, *International Journal of Mechanical Sciences*, doi:10.1016/j.ijmecsci.2017.11.028, 2017. [URL]

30. O.I. Ulven†, **W.C. Sun**, Capturing the two-way hydro-mechanical coupling effect on fluid-driven fracture in a dual-graph lattice beam model, *International Journal for Numerical and Analytical Methods in Geomechanics*, 42(5):736-767, doi:10.1002/nag.2763, 2017. [URL]

31. K. Wang*, **W.C. Sun**, A multiscale multi-permeability poroplasticity model linked by recursive homogenizations and deep learning, *Computer Methods in Applied Mechanics and Engineering*, 334(1):337-379, https://doi.org/10.1016/j.cma.2018.01.036, 2018. [URL]

32. S. Na*, **W.C. Sun**, Computational thermomerchanics of crystalline rock salt Part I: a combined phase field/crystal plasticity approach for single grain simulations, *Computer Methods in Applied Mechanics and Engineering*, 338:657-691, doi:10.1016/j.cma.2017.12.022, 2018. [URL]

33. J. Choo⋆, **W.C. Sun**, Coupled phase-field and plasticity modeling of geological materials: from brittle fracture to ductile flow, *Computer Methods in Applied Mechanics and Engineering*, 330:1-32, doi:10.1016/j.cma.2017.10.009, 2018. [URL]

34. J. Choo⋆, **W.C. Sun**, Cracking and damage from crystallization in pores: Coupled chemo-poro-mechanics and phase-field modeling, *Computer Methods in Applied Mechanics and Engineering*, 335:347-379, doi:10.1016/j.cma.2018.01.044, 2018. [URL]

35. **W.C. Sun**, T-F. Wong, Prediction of permeability and formation factors of sandstone with multi-scale lattice Boltzmann/finite element simulation on microtomographic images, *International Journal of Rock Mechanics and Mining Sciences*, 106:269-277, doi:10.1016/j.ijrmms.2018.04.020, 2018. [URL]

36. R. Gupta, S. Salager, **W.C. Sun**, K. Wang*, Open-source support toward validating and falsifying discrete mechanics models using synthetic granular materials Part I: Experimental tests with particles manufactured by a 3D printer, *Acta Geotechnica*, doi:10.1007/s11440-018-0703-0, 2018. [URL]

37. G. Liu†, **W.C. Sun**, S. M. Lowinger, Z Zheng, M Huang, J. Peng, Coupled flow network and discrete element modeling of injection-induced crack propagation and coalescence in brittle rock ,*Acta Geotechnica*, doi:10.1007/s11440-018-0682-1, 2018. [URL]

38. E. Bryant*, **W.C. Sun**, Mixed-mode phase field fracture for secondary cracks in anisotropic brittle rocks with consistent kinematics, *Computer Methods in Applied Mechanics and Engineering*, 342:561-584, doi:10.1016/j.cma.2018.08.008, 2018. [URL]

39. X. Zhong†, **W.C. Sun**, An adaptive reduced-dimensional discrete element model for dynamic responses of granular materials with high-frequency noises, *International Journal of Multiscale Computational Engineering*, 16(4):345-366, doi:10.1615/IntJMultCompEng.2018026895, 2018. [URL]

40. L. Mishnaevsky, C. Linder, **W.C. Sun**, Preface: Multiscale computational analysis of complex materials, *International Journal of Multiscale Computational Engineering*, doi:10.1615/IntJMultCompEng.2018027912, 2018.

41. K. Wang*, **W.C. Sun**, An updated Lagrangian LBM-DEM-FEM coupling model for dual-permeability porous media with embedded discontinuities, *Computer Methods in Applied Mechanics and Engineering*, 334:276-305, doi:10.1016/j.cma.2018.09.034, 2019. [URL]

42. K Wang*, **W.C. Sun**, Meta-modeling game for deriving theory-consistent, micro-structure-based traction-separation laws via deep reinforcement learning, *Computer Methods in Applied Mechanics and Engineering*, 346:216-241, doi:10.1016/j.cma.2018.11.026, 2019. [URL]

43. A. Qinami†, E. Bryant*, **W.C. Sun**, M. Kaliske, Circumventing mesh bias by r- and h-adpative techniques for variational eigen-fracture, *International Journal of Fracture*, doi:10.1007/s10704-019-00349-x, 2019.

44. C. Liu*, **W.C. Sun**, Shift domain material point method for solids in the finite deformation range, *Computational Particle Mechanics*, doi: 10.1007/s40571-019-00239-y, 2019.

45. K. Wang*, **W.C. Sun**, Q. Du, A cooperative two-player game for automated generations of elastoplasticity theories and models with AI-guided experimentation,*Computational Mechanics*, doi:,10.1007/s00466-019-01723-1, 2019. [URL]

46. E. Bryant*, **W.C. Sun**, A micromorphic-regularized anisotropic Cam-clay for capturing size-dependent anisotropy of geomaterials, *Computer Methods in Applied Mechanics and Engineering*, 354:56-95, doi:10.1016/j.cma.2019.05.003, 2019. [URL]

47. Y. Heider*,, **W.C. Sun**, Phase-field fracture in unsaturated porous media: application to drying-induced cracking, *Computer Methods in Applied Mechanics and Engineering*, , 359:112647, doi: 10.1016/j.cma.2019.112647, 2019.

48. S. Na*, E.C. Bryant*, **W.C. Sun**, A configurational force for adaptive re-meshing of gradient-enhanced poromechanics problems with history-dependent variables, *Computer Methods in Applied Mechanics and Engineering*, 357, 2019. [URL]

49. Y. Heider*, K. Wang*, **W.C. Sun**, SO(3)-invariance of graph-based deep neural network for anisotropic elastoplastic materials, *Computer Methods in Applied Mechanics and Engineering*, doi:10.1016/j.cma.2020.112875, 2020. [URL]

50. R. Ma*, **W.C. Sun**, FFT-based higher-order vs. mnulti-phase-field approaches for simulating strongly ansiotropic brittle fracture, *Computer Methods in Applied Mechanics and Engineering*, doi:10.1016/j.cma.2019.112781, 2020. [URL]

51. R. Ma*, **W.C. Sun**, Computational thermomechanics for crystalline rock. Part II: modeling damage-plasticity, healing and precipitation creeps in strongly anisotropic polycrystalline materials, *Computer Methods in Applied Mechanics and Engineering*, 369, 2020. [URL]

52. H.S Suh*, **W.C Sun**, An open-source FEniCS implementation of a phase field fracture model for micropolar continua, *International Journal for Multiscale Computational Engineering*, doi:10.1615/IntJMultCompEng.2020033422, 2019.

53. H.S. Suh*, D.T. O'Conner, **W.C. Sun**, A phase field model for cohesive fracture in micropolar continua, *Computer Methods in Applied Mechanics and Engineering*, 369, 2020. [URL]

54. N. Vlassis*, Ran Ma*, **W.C. Sun**, Geometric deep learning for computational mechanics Part I: anisotropic hyperelasticity, *Computer Methods in Applied Mechanics and Engineering*, 371(1):113299, 2020.

55. C. Liu*, **W.C. Sun**, ILS-MPM: An unbiased Nitsche's algorithm for frictional level set contacts via material point method, *Computer Methods in Applied Mechanics and Engineering*, 2020. [URL]

56. N. de Marchi†, **W.C. Sun**, Shear wave splitting and polarization in anisotropic fluid-infiltrating porous media: a numerical study, *Materials*, 13(21), 4988, doi:10.3390/ma13214988, 2020.

57. R. Ma*, **W.C. Sun**, Monolithic vs. operator splitting methods for solving phase field modeling of coupled crystal plasticity and twinning in poly-crystals, International Journal for Numerical Methods in Engineering, 10.1002/nme.6577, 2020. [URL]

58. K. Wang*, **W.C. Sun**, A non-cooperative mulit-agent game for self-generating/improved physics-constrained constitutive laws with AI-guided experimentations, *Computer Methods in Applied Mechanics and Engineering*, 371:113514, doi:10.1016/j.cma.2020.113514, 2021. [URL]

59. E.C. Bryant*, **W.C. Sun**, Phase field modeling of frictional slip with slip weakening/strengthening under non-isothermal conditions, *Computer Methods in Applied Mechanics and Engineering*, accepted, 2021.

60. X. Zhong†, **W.C. Sun**, Y. Dai, Proper orthogonal decomposition based dimensional reduction methods for explicit discrete element simulations, *Granular Matter*, doi:10.1007/s10035-020-01077-z, 2021.

61. H.S. Suh*, **W.C. Sun**, An immersed phase field model for microporomechanics of fracture-induced leakage, Physics of Fluids (Editor's pick), doi:10/1063/5.0035602, 2021.[URL]

62. N. Vlassis*, **W.C. Sun**, Sobolev neural network training for smoothed polycrystal plasticity models with interpertable components, *Computer Methods in Applied Mechanics and Engineering*, 337:113695, 2021. [URL]

63. Y. Heider⋆, H.S. Suh*, **W.C. Sun**, An offline multi-scale unsaturated poromechanics model enabled by self-designed/self-improved neural network, *International Journal for Numerical and Analytical Methods in Geomechanics*, doi:10.1002/nag.3196, 2021.

64. A. Fuchs†, Y. Heider⋆, K. Wang*, **W.C. Sun**, M. Kaliske, DNN^2: A hyper-parameter reinforcement learning game for self-design neural network elasto-plastic constitutive laws, *Computer and Structures*, doi:10.1016/j.compstruc.2021.106505, 2021.

65. B. Bahmani*, **W.C. Sun**, an accelerated hybrid data-driven/model-based approach for poroelasticity problems with multi-fidelity multi-physics data, *Computer Methods in Applied Mechanics and Engineering*, doi:10.1016/j.cma.2021.113868, 2021. [URL]

66. T. Xue, **W.C. Sun**, S. Adriaenssens, Y. Wei, C. Liu⋆, a new finite element level set re-initialization based on the shifted boundary method, *Journal of Computational Physics*, doi:10.1016/j.jcp.2021.110360, 2021. [URL]

67. R. Ma⋆, **W.C. Sun**, C. R. Picu, Atomistic-model informed pressure-sensitive crystal plasticity for crystalline HMX, *International Journal of Solids and Structures*, doi:10.1016/j.ijsolstr.2021.111170, 2021. [URL]

68. X. Sun, B. Bahmani*, N. Vlassis*, **W.C. Sun**, Y. Xu, Data-driven discovery of interpretable causal relations for deep learning material laws with uncertainty propagation, *Granular Matter*, doi:10.1007/s10035-021-01137-y, 2021. [URL]

69. M. Xiao*, **W.C. Sun**, C. Liu", DP-MPM: Domain partitioning material point method for evolving multi-body thermal-mechanical contacts and fragmentation, *Computer Methods in Applied Mechanics and Engineering*, doi:10.1016/j.cma.2021.114063, 2021. [URL]

70. H Suh*, **W.C. Sun**, Asynchronous phase field fracture model for porous media with thermally non-equilibrated constituents, *Computer Methods in Applied Mechanics and Engineering*, doi:10.1016/j.cma.2021.114182, 2021. [URL]

71. N. Vlassis*, **W.C. Sun**, Component-based machine learning paradigm for discovering rate-dependent and pressure-sensitive level-set plasticity models, *Journal of Applied Mechanics*, doi:10.1115/1.4052684, 2021. [URL]

72. R. Ma*, **W.C. Sun**, A finite micro-rotation material point method for micropolar solid and fluid dynamics with three-dimensional evolving contacts and free surfaces, *Computer Methods in Applied Mechanics and Engineering*, doi:10.1016/j.cma.2021.114540, 2021. [URL]

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108. G. Barkoulis Gavris*,**W.C. Sun**, Discovering neural elastoplasticity from kinematic observations, *Proceedings of the National Academy of Sciences*, 122(38), e2508732122, 2025. [URL].

109. H. Cai*, N.N. Phan*, **W.C. Sun**, Analytical solutions for Cook's membrane inferred by learning algorithms: A critical assessment of the expressivity-complexity trade-off, *Finite Elements in Analysis and Design*, accepted, 2025.

Manuscripts under review or in preparation

1. J. Storm, **W.C. Sun**, I.B.C.M. Rocha, F.P van der Meer, Mixing Data-Driven and Physics-Based Constitutive Models using Uncertainty-Driven Phase Fields, under review.
2. N.N. Phan, T. Sewell, J.D. Clayton, W.C. Sun, Higher-order elastic and thermal stress coefficients of β-HMX for high-fidelity continuum models: A neural network guide to calibrating thermoelasticity data from molecular dynamics, under review.
3. B. Bahmani*, **W.C. Sun**, Pre-training strategies for multi-objective/multi-task collocation physics-informed neural network, under review. [URL].

Peer Reviewed Conference Proceedings and Book Chapters

1. **W.C. Sun**, N.N. Phan*, Discovery of Symbolic Hyperelasticity Models for Anisotropic Solids Beyond Linear Combinations, Advances and Challenges in Computational Mechanics, Ed. by W. Graf et al., August, 2025.
2. J. Chung, R. Ahmad, M. Liu, **W.C. Sun** , W. Cai, T. Mukerji, Predicting rock transport and mechanical properties using graph neural networks, 58th US Rock Mechanics/Geomechanics Symposium held in Golden, Colorado, USA, 23-26 June, 2024.
3. J. Fish, K. Matous, R. Ghanem, **W.C. Sun**, Predictive multiscale paradigm for computational design certification, Comprehensive Mechanics Mechanics of Materials (book chapter), 2:303-351, `doi:10.1016/B978-0-323-90646-3.00052-6`, 2004. [URL].
4. Y. Heider, W.C. Sun, Objectivity and accuracy enhancement within ANN-based multiscale material modeling, Proceedings in Applied Mathematics and Mechanics, doi:10.1002/pamm.202200203, 2023. [URL].
5. Y. Heider*, **W.C. Sun**, B. Markert, Advancements in multi-phase unsaturated porous media, Proceedings in Applied Mathematics and Mechanics, `doi:10.1002/pamm.202000223`, 2021.
6. H.S. Suh*, **W.C. Sun**, An immersed phase field fracture model in fluid-infiltrating porous media with evolving Beavers-Joseph-Saffman condition, 2nd International Conference on Energy Geotechnics, La Jolla, California, USA, 2021.
7. E.C. Bryant*, **W.C. Sun**, A micromorphic regularized anisotropic Cam-clay model for capturing the anisotropic size effect of shale, clay and mudstone, 5th US Rock Mechanics/Geomechanics Symposium, American Rock Mechanics Association, New York, 2019.
8. S. Na*, **W.C. Sun**,A multi-phase-field/polycrystal plasticity for rock salt: micromorphic regularized grain-boundary slip, 5th US Rock Mechanics/Geomechanics Symposium, American Rock Mechanics Association, New York, 2019.
9. S. Na*, **W.C. Sun**, A multi-phase-field anisotropic damage-plasticity model for crystalline rocks, *China-Europe Conference on Geotechnical Engineering*, Springer Series in Geomechanics and Geoengineering, `doi:10.1007/978-3-319-97112-413`, 2018. [URL]

10. I. Wollny, **W.C. Sun**, Modeling of the tire-soil-water interaction of fluid-infiltrated road via a hierarchical sequential poromechanics ALE formulation, 6th European Conference on Computational Mechanics, Glasgow, the United Kingtom, 2018
11. K. Wang*, **W.C. Sun**, Data-driven discrete-continuum method for partially saturated micro-polar Porous Media, *6th Biot Conference on Poromechanics*, doi:10.1061/9780784480779.070, 2017. [URL]
12. K. Wang*, **W.C. Sun**, Micropolar DEM-FEM method for granular materials, *Proceedings in European Congress of Computational Mechanics*, Crete Island, Greece, 2016.
13. J. Zhao, N. Guo, **W.C. Sun**, A multiscale study of inherent anisotropy and strain localization in granular soils, *15th Asian Regional Conference on Soil Mechanics and Geotechnical Engineering*, Japan, 2015.
14. **W.C. Sun**, Stabilized mixed finite element modeling of unsaturated flow barrier and fractured porous media at finite strain, *17th US National Congress on Theoretical and Applied Mechanics*, Michigan State University, 2014.
15. **W.C. Sun**, M.R. Kuhn and J.W. Rudnicki, A micromechanical analysis on permeability evolution of a dilatant shear band, ARMA 14-7626, *40th US Rock Mechanics and Geomechanics Symposium*, Minneapolis, MN, USA, 2014.
16. Q. Chen, **W.C. Sun** and J.T. Ostien, Finite element analysis of hydro-mechanical coupling of fully saturated collapsible geomaterials, *Proceedings of GeoShanghai 2014 Conference*, Shanghai, China, 2014.
17. **W.C. Sun**, J.E. Andrade, Diffuse bifurcations of porous media under partially drained conditions, *Springer Series in Geomechanics and Geoengineering*, 2:61-64, doi:10.1007/978-3-642-19630-0_16, 2011.[URL]
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19. **W.C. Sun** and J.E. Andrade, Surface slumping of submarine slope and its relation to material instability, *Proceedings of 16th US National Congress on Theoretical and Applied Mechanics*, University Park, Pennsylvania, 2010.
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Selected Plenary Lectures, Keynotes, Distinguished Lectures, and Department Seminars

Plenary lectures & Keynotes

1. **W.C. Sun**, Mechanics of frozen soils, Keynote Lecture, the 17th international conference of the International Association for Computer Methods and Advances in Geomechanics, Hong Kong, China, December 18-21, 2025 (scheduled).
2. **W.C. Sun**, Constitutive Modeling in the Era of AI, Distinguished Lectures on Computational Mechanics at International Mechanical Engineering Congress & Exposition (IMECE), Memphis, TN, November 16-20, 2025 (scheduled).
3. **W.C. Sun**, Cold region computational mechanics, plenary lecture, 8th Biot Conference on Poromechanics, October 7, Salt Lake City, 2025 (scheduled).
4. **W.C. Sun**, Constitutive Laws as Generative Graphs and Trees, COMPLAS 2025, XVII International Conference on Computational Plasticity. Fundamentals and Applications, Barcelona, plenary lecture, Spain 2-5 September, 2025 (scheduled).
5. **W.C. Sun**, Deep Generative Graphs for Synthesizing Microstructure of Topology Preserved Microstructures, 2025 Harrington Fellow Symposium, UT Austin (Oden Institute), June 2025. [Video]
6. **W.C. Sun**, EUROMECH Colloquium "Data-driven mechanics and physics of materials", Invited Plenary Lecture, Gothenburg, Sweden, 21-23- May 2025.
7. **W.C. Sun**, Machine learning supported constitutive modeling of granular materials: from forecasting behaviors to interpretable reasoning, Plenary Lecture, Machine Learning for Discrete Granular Media, Lorentz Center, Leiden University, Netherlands, 29 April, 2024.
8. **W.C. Sun**, Pursuing trustworthy machine learning for multiscale meta-modeling of materials, Keynote Lecture, Workshop on Experimental and Computational Fracture Mechanics, Baton Rouge, Lousisiana,March 4th, 2024.
9. **W.C. Sun**, Geometric machine learning for particle mechanics, Semi-plenary Lecture, VII International Conference on Particle-based Methods, Milan, 9-11th October 2023.
10. **W.C. Sun**, N.N. Vlassis, Q. Yin, M. Xiao, Deep geometric learning enabled explainable AI to write and disprove multiscale plasticity models autonomously CONCAM Distinguished Lectures on Computational Mechanics, American Society of Mechanical Engineers, October 30th, 2022.
11. **W.C. Sun**,High-fidelity MPM simulations for single- and multi-particle fracture fragmentations in the finite deformation/rotation regime, keynote lecture, Virtual Laboratory Testing and micromechanics, Norwegian Geotechnical Institute, Olso, Norway, September, 22nd-23rd, 2022.
12. **W.C. Sun**, Deep geometric prior for plasticity of geomaterials, HKSTAM Distinguished lecture, Hong Kong Society of Theoretical and Applied Mechanics, August 20, 2022.
13. **W.C. Sun**, A triple-scale discrete-continuum coupling method for path-dependent porous media enhanced by recurrent and recursive deep learning, Thematic Plenary Lecture, 9th International Conference on Computational Methods, Rome, Italy, August 6-10th, 2018.

14. **W.C. Sun**, Modeling and validating a micropolar multiscale model for wetted granular matters, keynote Lecture, the International Symposium on Plasticity and Its Current Applications, Keauhou Bay, Hawaii, 2016.

Invited Department Seminars

1. **W.C. Sun**, Geometric representation of constitutive laws represented by points, graphs and equations, Department seminar, Georgia Institute of Technology, 5 May 2025.
2. **W.C. Sun**, Machine learning enabled inverse and forward problems for polymer-bonded energetic materials, Structures and Applied Mechanics Seminar Series, University of Connecticut, April 4, 2025.
3. **W.C. Sun**, Machine learning enabled inverse and forward problems for polymer-bonded energetic materials, Civil and Environmental Engineering Department Seminar & Computational Science Colloquium, Case Western Reserve University, November 14, 2024.
4. **W.C. Sun**, Machine learning enabled inverse and forward problems for polymer-bonded energetic materials, Theoretical and Applied Mechanics Seminar, Department of Mechanical Engineering, Northwestern University, October 24, 2024.
5. **W.C. Sun**, Computational geomechanics for frozen soils, Bruce Podwal Seminar Series at City College of New York, February 27th, 2024.
6. **W.C. Sun**, Data-driven embedding for computational mechanics: from mode-based to model-free predictions and back, Computational Mechanics at Oak Ridge National Laboratory, January 18th, 2024.
7. **W.C. Sun**, Geometric Learning for solid mechanics, Structural Engineering, Structural Engineering Seminar Series, University of Illinois Urbana Champaign, 27, November 2023.
8. **W.C. Sun**, Geometric learning for mechanics of materials and structure, Frontiers in Computational Mechanics, Department of Civil and Environmental Engineering, Princeton University, October 30th, 2023.
9. **W.C. Sun**, Geometric learning enhanced computational mechanics, Apple FEM/ML Forum, Apple, Inc, May 11th, 2023.
10. **W.C. Sun**, Geometric learnings for anisotropic materials of complex structures, Invited seminar, Lawrence Livermore National Laboratory, April 27th, 2023.
11. **W.C. Sun**, model-free data-driven engineering, graduate seminar, Department of Civil and Environmental Engineering, University of Pittsburgh, April 21, 2023.
12. **W.C. Sun**, Machine learning for geomechanics, Geosystem Graduate Seminar Series, Department of Civil and Environmental Engineering, University of California, Berkeley, April 12th, 2023.
13. **W.C. Sun**, Non-Euclidean data-driven computational Mechanics, Department of Mechanical and Civil Engineering, Caltech, April 5th, 2023.
14. **W.C. Sun**, Multi-scale phase field modeling of freeze-thaw actions in frozen soils under changing climates, SEG department seminar, Department of Civil and Environmental Engineering, Stanford University March 3rd, 2023.
15. **W.C. Sun**, Geometric machine learning for computational solid mechanics, Materials Research Interest Group MRIG seminar, University of Missouri, January 23rd, 2023.

16. **W.C. Sun**, N.N. Vlassis, B. Bahmani, M. Xiao, Geometric Learning for plasticity, ML-SIG seminar, ANSYS, January 19th, 2023.
17. **W.C. Sun**, HS, Suh, Q Yin, Computational geomechanics of the thawing and freezing frozen soils, Department seminar, Department Seminar, Department of Civil and Environmental Engineering, University of California, Davis, January 18th, 2023.
18. **W.C. Sun**, Graph embedding for interpretable multiscale plasticity, LSU Colloquium on Artificial Intelligence Research and Optimization, Louisiana State University, Baton Rouge, Lousiana, November 2nd, 2022.
19. **W.C. Sun**, Geometric learning for multiscale granular plasticity, Machine-ground interaction consortium (MaGIC) meeting, University of Wisconsin-Madison, September, 20th-22nd, 2022.
20. **W.C. Sun**, Data-driven geometric mechanics for path-dependent materials, Distinguished departmental seminar, Department of Mechanical Engineering, University of Houston, September 1st, 2022.
21. **W.C. Sun**, Multiscale geometric learning for modeling path-dependent materials, KDF Guest Seminar Lecture, Technion-Israel Institute of Technology, August 23, 2022.
22. **W.C. Sun**, Data-driven solid mechanics for big and small data, Department of Structural Engineering Seminar, University of California, San Diego, April 13th, 2022.
23. **W.C. Sun**, Manifold embedding model-free finite strain elasticity, Joint seminars for Structural Engineering and Engineering Mechanics, Data-driven Engineering Science seminar series, University of Colorado, Boulder, March 17th, 2022. [URL]
24. **W.C. Sun**, Simulating dynamic fracture and fragmentation for brittle materials, Department Seminar, University of Texas at El Paso, January 22nd, 2022.
25. **W.C. Sun**, Data-driven Simulations: from model-free poroelasticity to level set plasticity enabled by deep learning, invited lecture, International Symposium of Soft ground and smart geotechnology, Hong Kong Polytechnics University, January 6th, 2022.
26. **W.C. Sun**, Data-driven constitutive updates: from model-free poroelasticity to level set plasticity, DDPS Seminar, Lawrence Livermore National Laboratory, November 12th, 2021. [URL]
27. **W.C. Sun**, Geometric learning for computational solid mechanics, Invited Seminar, Hamburg University of Technology, November 8th, 2021.
28. **W.C. Sun**, Computational geomechanics for nuclear waste disposal, Department Seminar, Clarkson University, October 29th, 2021.
29. **W.C. Sun**, Thermodynamic-informed machine learning for polycrystal plasticity, ME Seminar Series, University of Connecticut, February 26th, 2021.
30. **W.C. Sun**, Thermodynamic-informed machine learning for solid mechanics, Sandia National Laboratories, January 28th, 2021.
31. **W.C. Sun**, The meta-modeling of a plasticity modeler: a level set approach, Machine Learning in Science & Engineering Conference, Columbia University, December 14-15, 2020.
32. **W.C. Sun**, Geometric learning for computational plasticity with limited data, Department Seminar, ETH Zurich, November 26, 2020.

33. **W.C. Sun**, Spotting hidden weakness of constitutive laws with non-cooperative game, CRUNCH seminar, Brown University, November 7, 2020.
34. **W.C. Sun**, Geometric learning for computation plasticity with level set hardening, Johns Hopkins University, October 29, 2020.
35. **W.C. Sun**, Upscaling DNS discrete element / Lattice Boltzmann simulation to macroscopic porous continua, September 26, 2020.
36. , **W.C. Sun**, Some applications of graph theory in data-driven multi-scale mechanics, USACM Summer Seminar, July 17, 2020.
37. N. N. Vlassis, R Ma, **W.C. Sun**, Geometric Learning for Computational Mechanics, Asian Pacific Congress on Computational Mechanics, Taipei, December 19th, 2019.
38. **W.C. Sun**, A non-cooperative zero-sum game for creating, validating and falsifying predictive poromechanics models, University of Nottingham., December 13th, 2019.
39. **W.C. Sun**, A Gradient damage-plasticity framework for fluid-infiltrating geomaterials with size-dependent anisotropy, University of Nottingham., December 13th, 2019.
40. **W.C. Sun**, A non-cooperative game for creating, validating and falsifying predictive polycrystal and granular materials with non-Euclidean internal variables, Mechanical and Aerospace Engineering colloquium, Sibley School of Mechanical and Aerospace Engineering, Cornell University, October 29th, 2019.
41. **W.C. Sun**, A non-cooperative game for creating, validating and falsifying predictive polycrystals with non-Euclidean internal variables, Department of Civil and Environmental Engineering, Northwestern University, October 17th, 2019.
42. **W.C. Sun**, A micromorphic phase field framework for geomaterials with size-dependent strong anisotropy, Department of Civil and Environmental Engineering, University of Illinois Urbana-Champaign, October 16th, 2019.
43. **W.C. Sun**, Micromorphic gradient plasticity for shale, soil and other polycrystalline rock, Invited Seminar, Lawrence Livermore National Laboratory, 2019.
44. **W.C. Sun**, A cooperative mulit-agent game for self-generating/improved physics-constrained constitutive laws with AI-guided experimentations, Computational Data Science Approach for Materials, J.R. Oppenheimer Study Center, Los Alamos National Laboratory, Los Alamos, New Mexico, 2019.
45. **W.C. Sun**, Machine Learning for Solid Mechanics, Invited Seminar, Lawrence Livermore National Laboratory, June, 2019.
46. **W.C. Sun**, Phase field damage-plasticity frameworks for fluid-infiltrating geomaterials with size-dependent anisotropy for geological disposals, , Department of Civil and Environmental Engineering, Stanford University, 2019.
47. **W.C. Sun**, A cooperative multi-agent game for automated physical model generations with AI-guided experimentation, Mesh-free Methods and Advances in Computational Mechanics Workshop, Meshfree Methods and Advances in Computational Mechanics Workshop, Pleasanton, California , 2019.
48. **W.C. Sun**, W.C. Sun, Computational soil mechanics beyond critical state plasticity, Winter Workshop on Mineral-bonded Composite for Enhanced Structural Impact Safety, Technische Universität Dresden, Germany, 2019.

49. **W.C. Sun**,A meta-modeling game for deriving theory-consistent microstructure-based constitutive laws for poromechanics problems, Department of Civil and Environmental Engineering, Department of Civil and Environmental Engineering, Pennsylvania State University, 2018.
50. **W.C. Sun**, An adaptive micromorphic-regularized Cam-clay-type model for fluid-infiltrating geological materials, Cold Regions Research and Engineering Laboratory, US Army Corps of Engineers, Hanover, New Hampshire, 2019.
51. **W.C. Sun**, A cooperative two-player game for automated generations of elasto-plasticity theories and models with AI-guided experimentation, the 3rd Mesoscale Modeling of Explosive Initiation Workshop, Fort Walton Beach, Florida, 2018.
52. **W.C. Sun**, A multiscale damage-plasticity model for capturing brittle-ductile transition in anisotropic fluid-infiltrating porous rock, Department of Mechanical, Aerospace, and Nuclear Engineering, Rensselaer Polytechnic Institute, 2018.
53. **W.C. Sun**, Meta-modeling of geological materials: generating mathematical models by hybridizing theory and data, Los Alamos National Laboratory, 2018.
54. **W.C. Sun**, Meta-modeling of porous media with strain localization and embedded strong discontinuities, Sandia National Laboratories, 2018.
55. **W.C. Sun**,Deep-learning enabled multiscale poromechanics: from brittle fracture to ductile flow, Department of Civil Engineering and Engineering Mechanics, Duke University, 2018.
56. **W.C. Sun**, A reinforcement learning approach for modeling the brittle-ductile transition in geological materials, ExxonMobil Research and Engineering Company, 2018.
57. **W.C. Sun**,K-fold validation for hybridized theory-based/data-driven anisotropic path-dependent constitutive models for geological materials and beyond, Naval Research Laboratory, 2018.
58. **W.C. Sun**, A multiscale damage-plasticity model for anisotropic fluid-infiltrating crystalline rock salt, Department of Civil and Environmental Engineering, the George Washington University, 2018.
59. **W.C. Sun**, Hybrid data-driven multiscale modeling of brittle and ductile responses of fluid-infiltrating geomaterials, 2017 AFOSR Young Investigator Research Program Meeting, Basic Research Innovation and Collaboration Center (BRICC), Arlington, 2017.
60. **W.C. Sun**, Data-driven computational geomechanics, Department of Civil Engineering, the University of Hong Kong, 2017.
61. **W.C. Sun**, Accelerating multiscale discrete-continuum modeling of fluid-infiltrating geomaterials with deep learning, Department of Civil and Environmental Engineering, Hong Kong University of Science and Technology, 2017.
62. **W.C. Sun**, A multiscale damage-plasticity model for compaction band and fractures in anisotropic fluid-infiltrating porous media, Department of Earth Science and Engineering, Imperial College London, the United Kingdom, 2017.
63. **W.C. Sun**, Data-driven multiscale modeling of fractured porous media with cross-validations, Lund University, Lund, Sweden, 2017.
64. **W.C. Sun**, Data-driven multiscale geomechanics, Geomechanics Department, Sandia National Laboratories, 2017.

65. **W.C. Sun**, A discrete-continuum coupling model for fractured porous media with embedded branched-discontinuities in the finite deformation range, Department of Civil and Environmental Engineering, Princeton University, 2017.
66. **W.C. Sun** A critical comparison of variational phase field and eigen-erosion modeling of fractures in fluid-infiltrating porous media: from brittle faulting to cataclastic flow, Department Seminar, Department of Civil and Environmental Engineering, Georgia Institute of Technology, 2017.
67. **W.C. Sun** Data-driven computational poromechanics across length scales, Henry L. Pierce Laboratory Seminar Series, Massachusetts Institute of Technology, 2017.
68. **W.C. Sun** Multiscale discrete-continuum modeling of porous media in extreme environments, Department Seminar, Department of Civil and Environmental Engineering, New Jersey Institute of Technology, 2017.
69. **W.C. Sun**, Data-driven multiscale poromechanics for cold region applications, Cold Regions Research and Engineering Laboratory, US Army Corps of Engineers, Hanover, New Hampshire, 2016.
70. **W.C. Sun**, A variational eigen-deformation model for simulating compaction band and fracture propagation in fluid-infiltrating porous media, Jointed Department Seminar, Department of Civil and Environmental Engineering, Department of Mechanical Engineering, Northwestern University, 2016.
71. **W.C. Sun**, Multiscale discrete-continuum modeling of fluid-infiltrating, partially-frozen and quasi-brittle porous media, Lawrence Livermore National Laboratory, Livermore, California, 2016.
72. **W.C. Sun**, Modeling fluid-infiltrating, partially-frozen and quasi-brittle porous media with nonlocal discrete-continuum techniques, Lecture Series on Interaction Modeling in Mechanized Tunneling, Ruhn-University Bochum, Germany, 2016.
73. **W.C. Sun**, Computational mechanics for porous media in extreme environments, Department Seminar, Technical University of Dresden, Germany, 2016.
74. **W.C. Sun**, Computational geomechanics for fluid-infiltrating, thermal-sensitive and partially frozen granular materials, Machine-ground Interaction Consortium Workshop: Next Generation Mobility Modeling and Simulation, the Suburban Collection Showplace, 46100 Grand River Avenue, Novi, Michigan, 2016.
75. **W.C. Sun**, Some remarks on modeling fluid-infiltrating, thermal-sensitive, and partially-frozen porous media across length scales, Applied Mechanics Colloquia, John A. Paulson School of Engineering and Applied Sciences, Harvard University, 2016.
76. **W.C. Sun**, Computational Thermoporomechanics, University of Perugia, Perugia, Italy, 2015.
77. **W.C. Sun**, Validation and Verification of Discrete-continuum coupling modeling of granular materials, 3D Printing and Digital Rock Physics Workshop, Santa Fe, New Mexico, 2015. Albuquerque, New Mexico, 2015.
78. **W.C. Sun**, Coupling dissimilar hydromechanical models for fluid-saturated porous media from grain to field scales, Los Alamos National Laboratory, Los Alamos, New Mexico, 2015.

79. **W.C. Sun**, Multiscale Modeling for fluid-infiltrating fractured porous media, Claude R. Hocott Lecture, Department of Petroleum and Geosystems Engineering, the University of Texas at Austin, Austin, Texas, 2015.
80. **W.C. Sun**, Concurrent and hierarchical multiscale modeling of shear bands in fluid infiltrating solids multiscale modeling of deformation bands, Civil and Material Engineering Seminar, University of Illinois at Chicago, 2014.
81. **W.C. Sun**, Two-scale modeling of shear bands in fluid infiltrating solids, Joint Materials/Solid Mechanics Seminar Series, Brown University, 2014.
82. **W.C. Sun**, Modeling Thermo-hydro-mechanics at finite strain, UC Davis Geotechnical Seminar Series, University of California, Davis, 2013.
83. **W.C. Sun**, Modeling multiphysical coupling effects of deformation bands across length scales, Lawrence Livermore National Laboratory, Livermore, California, 2013.
84. **W.C. Sun**, Modeling fully coupled hydromechanical process in porous media across different length scales, invited seminar, department of civil and environmental engineering, the Hong Kong Polytechnic University, Hong Kong, China, 2013.
85. **W.C. Sun**, Multiscale modeling of thermo-hydro-mechaical coupling effects in deformation band, Department of Civil and Environmental Engineering, Carnegie Mellon university, Pittsburgh, Pennsylvania, 2013.
86. **W.C. Sun**, Modeling fully coupled hydromechanical process in porous media across different length scales, Shell Westhollow Technology Center, Novenmber 28th, Houston, Texas, 2012.
87. **W.C. Sun**, Computational poromechanics across different length scales, Engineering Science Center, Sandia National Laboratories, Albuquerque, New Mexico, 2012.
88. **W.C. Sun**, Analyzing interplays between microstructures and macroscopic transport properties of shear-enhancedbands with a multi-scale framework, Army Research Laboratory, Aberdeen Proving Ground, Maryland, 2011.
89. **W.C Sun**, A multiscale analysis on porous microstructures of deformation bands and their implications on macroscopic transport of pore-fluid, Los Alamos National Laboratory, New Mexico, 2011.
90. **W.C Sun**, A multiscale analysis of strain localizations in fully saturated porous media, Naval Research Laboratory, John C.Stennis Space Center, Mississippi, 2011.
91. **W.C Sun**, Connecting micro-structural attributes and macroscopic fluid transport properties of two-phase porous media with a multi-scale framework,Oak Ridge National Laboratory, Oak Ridge, Tennessee, 2011.

Teaching Experience

Term	Subject Number	Title	Course Level	Role
Spring 2014	CIENE3141	Soil Mechanics	Undergradate	Lecturer
Fall 2014	ENMEE6320	Computational Poromechanics	Graduate	Lecturer
Spring 2015	CIENE3141	Soil Mechanics	Undergradate	Lecturer
Fall 2015	CIENE4253	Finite Elements for Geotech	Graduate	Lecturer
Spring 2016	CIEN3141	Soil Mechanics	Undergradate	Lecturer
Fall 2016	ENMEE6320	Computational Poromechanics	Graduate	Lecturer
Spring 2017	CIEN3141	Soil Mechanics	Undergradate	Lecturer
Fall 2017	CIENE4253	Finite Elements for Geotech	Graduate	Lecturer
Spring 2018	CIEN3141	Soil Mechanics	Undergradate	Lecturer
Fall 2018	ENMEE6320	Computational Poromechanics	Graduate	Lecturer
Spring 2019	CIEN3141	Soil Mechanics	Undergradate	Lecturer
Fall 2019	CIENE4253	Plasticity and Finite Element	Graduate	Lecturer
Spring 2020	CIEN3141	Soil Mechanics	Undergradate	Lecturer
Fall 2020	ENMEE6320	Computational Poromechanics	Graduate	Lecturer
Spring 2021	CIEN3141	Soil Mechanics	Undergradate	Lecturer
Fall 2021	ENMEE6320	Plasticity and Finite Element	Graduate	Lecturer
Spring 2022	CIEN3141	Soil Mechanics	Undergradate	Lecturer
Fall 2022	N/A	N/A	N/A	Sabbatical
Spring 2023	N/A	N/A	N/A	Sabbatical
Fall 2023	CIENE4253	Computational Mechanics with AI	Graduate	Lecturer
Spring 2024	ENMEE6320	Computational Poromechanics	Graduate	Lecturer
Fall 2024	CIENE4253	Computational Mechanics with AI	Graduate	Lecturer
Spring 2025	ENMEE6320	Computational Poromechanics	Graduate	Lecturer
Fall 2025	CIENE4253	Computational Mechanics with AI	Graduate	Lecturer

Teaching Evaluation

The mean and standard deviation of the course and instructor qualities are reported. The complete teaching evaluation record have been stored at [URL]. All graduate courses are taught without TA support provided.

Undergraduate course

Term	Title	Response	Course Quality	Instructor Quality
Pre-tenure				
Spring 2014	CIEN3141 Soil Mechanics	29.17%	3.29 ± 1.16	3.14 ± 1.23
Spring 2015	CIEN3141 Soil Mechanics	27.91%	3.33 ± 1.15	3.33 ± 1.15
Spring 2016	CIEN3141 Soil Mechanics	39.29%	2.25 ± 1.30	2.25 ± 1.44
Spring 2017	CIEN3141 Soil Mechanics	33.33%	3.11 ± 1.27	3.60 ± 0.55
Spring 2018	CIEN3141 Soil Mechanics	27.27%	2.50 ± 1.05	2.17 ± 1.17
Spring 2019	CIEN3141 Soil Mechanics	35.71%	3.20 ± 1.14	2.90 ± 0.88
Post-tenure				
Spring 2020	CIEN3141 Soil Mechanics	91.3%	4.05 ± 0.86	4.14 ± 0.73
Spring 2021	CIEN3141 Soil Mechanics	84.21%	4.13 ± 0.89	4.13 ± 0.89
Spring 2022	CIEN3141 Soil Mechanics	93.10%	4.41 ± 0.80	4.22 ± 0.85
Spring 2023	Sabbatical			

Graduate courses

Term	Title	Response	Course Quality	Instructor Quality
Pre-tenure				
Fall 2014	ENME6320 Comp. Poromech.	66.67%	3.38 ± 1.30	3.75 ± 1.28
Fall 2015	CIEN4253 FEM for Geotech.	100%	4.50 ± 0.84	5.0 ± 0.00
Fall 2016	ENME6320 Comp. Poromech.	85.71%	4.83 ± 0.41	5.0 ± 0.00
Fall 2017	CIEN4253 FEM for Geotech	60.00%	5.00 ± 0.0	5.0 ± 0.00
Fall 2018	ENME6320 Comp. Poromech.	Evaluation not available in Courseworks		
Fall 2019	CIEN4253 Plasticity & FEM	40.00 %	5.00 ± 0.0	4.14 ± 0.73
Post-tenure				
Fall 2020	ENME6320 Comp. Poromech.	Evaluation not available Courseworks		
Fall 2021	ENME6320 Plasticity & FEM	33.33%	4.00 ± 0.00	3.67 ± 0.58
Fall 2022	Sabbatical			
Fall 2023	CIEN4253 Comp. Mech. w/ AI	66.67%	4.75 ± 0.50	4.75 ± 0.50
Spring 2024	ENME6320 Comp. Poromech.	42.86%	5.00 ± 0.00	5.00 ± 0.00
Fall 2024	CIEN4253 Comp. Mech. w/ AI	22.22%	4.50 ± 0.00	4.50 ± 0.00
Spring 2025	ENME6320 Comp. Poromech.	Evaluation not available in Courseworks		

Computational Poromechanics. New course introduced in Fall 2014. Course description: A fluid infiltrating porous solid is a multiphase material whose mechanical behavior is significantly influenced by the pore fluid. In particular, the diffusion, advection, capillarity, heating, cooling and freezing of pore fluid, the build-up of pore pressure and the mass exchanges among the solid and fluid constituents may all influence the stability and integrity of the solid skeleton, cause shrinkage, swelling, fracture or liquefaction. These coupling phenomena are important for numerous disciplines, including but not limited to geophysics, biomechanics, and material sciences. The objective of this course is to present the fundamental principles of poromechanics that are essential for engineering practice and to prepare students for more advanced study on porous media. We will cover a selected number of topics, including but not limited to balance principles, Biot's poroelasticity, mixture theory, constitutive modeling of path independent and dependent multiphase materials, numerical methods for parabolic and hyperbolic systems, inf-sup conditions and common stabilization procedures for mixed finite element models, explicit and implicit time integrators, and operator splitting techniques for poromechanics problems.

Computational Mechanics with AI. New course introduced in Fall 2023. Course description: Realistic physical simulations of solid materials have a wide range of applications, from designing dam and earth structures and predicting failures of structural components in vehicles and building collapses to physical modeling for computer animation, computer graphics, and virtual and augmented realities. A fundamental building block of computer simulations is the material models or constitutive laws, which predict the relationships among strain history, microstructure evolution, and stress responses. This course aims to teach students the most recent trends in the art of constitutive models for a variety of natural (e.g., sand, clay, rock) and manufactured materials (e.g., rubber, concrete, alloys) in modern engineering applications. This course will cover theories, computational models, and machine learning skills necessary for forecasting elastic and path-dependent material behaviors of solids. The course will have three types of lectures (theory (T), computation (C), and machine learning (ML)) delivered in sequential order for three topics (1) elastic materials with hyper-elasticity functionals, (2) plasticity theory for solids, and (3) selected advanced topics (e.g., Lie group interpolation, manifold learning, graph embedding, neural network inverse problems, designs of experiments, physics informed neural network, non-convex optimization, model-free solvers) for data-driven mechanics.

Grants and Contracts

Sun research group has been supported by the Department of Energy, Air Force Office of Scientific Research, Army Research Office, National Science Foundation (CMMI and EAR divisions), Department of Defense, Sandia National Laboratories, the National Nuclear Security Administration, and Columbia University, including the Young Investigator Program Awards from ARO and AFOSR and the NSF CAREER award. Since joining Columbia in January 2014, the PI has been awarded more than $7.7 million US dollars of research expenses (190 times of the startup package), with a total support of over $26 million US dollars. Pending proposals are not included in this CV.

1. Generative AI-enabled high-precise digital twins of patient-specific polytetrafluoroethylene artificial heart valves for children
   Funding Agency: Columbia University
   Duration 9/1/2025- 8/31/2026 Amount: $100,000
   PI: **W.C. Sun**, Jeffrey W. Kysar

2. Geometric Machine Learning Integrated Experiments and Modeling for High-Strain-Rate Responses of Frozen Soil: from Morphology to Characterization
   Funding Agency: Army Research Office
   Duration: 4/15/2024-4/14/2027 Amount: $ 766, 844
   PI: **W.C. Sun**, A. Kidane

3. Meso-Scale Modeling of Damage Initiation and Propagation in heterogeneous Energetic Materials and its Impact on Sensitivity
   Funding Agency: Air Force Office of Scientific Research
   Duration: 8/1/2022-7/42/2026 Amount: $ 750,000
   PI: A. Kidane, **W.C. Sun**

4. Generative-AI-Enabled Multiscale Artificial Ground Freezing Engineering for Safe and Sustainable Mining
   Funding Agency: Qiu Zhong Wei Program, Columbia University
   Duration: 9/1/2023-8/1/2024
   Amount: $145, 000
   PI: **W.C. Sun**

5. UPS Foundation Visiting Professorship
   Funding Agency: Stanford University and UPS Foundation
   Duration: 8/1/2022-8/1/2023
   Amount: $200, 000 (for sabbatical leave expense)
   PI: **W.C. Sun**

6. Game-theoretic machine learning design of experiment
   Funding Agency: Sandia National Laboratories
   Duration: 10/1/2021-9/30/2022 Amount: $ 121,689
   PI: **W.C. Sun** (as a subcontractor of a DOE-LDRD proposal)

7. Machine Learning Anisotropy Plasticity modeling for extruded Al 7079: Establishing AI-enable workflow from experiment to deployable machine learning plasticity models
   Funding Agency: Sandia National Laboratories

Duration: 1/1/2022-12/31/2023 Amount: $157,404
PI: **W.C. Sun** (as a subcontractor of a DOE-LDRD proposal)

8. Equivariant geometric learning paradigm for interpretable polycrystal plasticity models of energetic materials with evolving microstructures
Funding Agency: Air Force Office of Scientific Research
Duration: 9/1/2021-8/31/2024 Amount: $ 413,244
PI: **W.C. Sun**

9. Title: CAREER: Computational failure mechanics across multiple scales with deep reinforcement learning Funding Agency: National Science Foundation
Duration: 1/1/2019-12/31/2023
Amount: $664,156
PI:**W.C. Sun**

10. Title: DURIP: A TPU-enhanced deep reinforcement learning approach for automated generations of interpretable models for energetic materials across length scales
Funding Agency: Air Force Office of Scientific Research
Duration: 1/1/2019-12/31/2023
Amount: $94,156
PI: **W.C. Sun**

11. Title: Phase field modeling of ice-segregation induced fracture and thawing plasticity in frozen geomaterials with unfrozen water
Funding Agency: Army Research Office
Duration: 6/1/2018-5/31/2022
Amount: $360,000
PI: **W.C. Sun**

12. Title: Broaden undergraduate and high school student participation for cold-region soil mechanics
Funding Agency: Army Research Office
Duration: 6/1/2019-5/31/2021
Amount: $20,000
PI: **W.C. Sun**

13. Title: INTERN: Adaptive phase field Arlequin moddels for material failures
Funding Agency: National Science Foundation
Duration: 1/1/2019-12/31/2019
Amount: $50,000
PI: **W.C. Sun**

14. Title: Young Investigator Program Award: Modeling the High-rate Responses of Wetted Granular Materials Across Scales and the Third-party Replicable Validation Exercises Utilizing 3D Printers
Funding Agency: Air Force Office of Scientific Research
Duration: 1/1/2017-12/31/2020
Amount: $360,000
PI: **W.C. Sun**

15. Title: Broaden undergraduate and high school student participation for cold-region computational geomechanics

Funding Agency: Army Research Office
Duration: 6/1/2018-5/31/2019
Amount: $13,206
PI: **W.C. Sun**

16. Title: An integrated multiscale experimental-numerical analysis on reconsolidation of salt-clay mixture for disposal of heat-generating waste
Funding Agency: Department of Energy
Duration: 10/1/2016-9/31/2019
Amount: $800,000
PI: **W.C. Sun**

17. Title: A phase field Arlequin model for resolving non-local hydromechanical effects of porous media across time and spatial Scales
Funding Agency: National Science Foundation
Duration: 8/1/2015-7/31/2019
Amount: $300,000
PI: **W.C. Sun**

18. Title: Young Investigator Program Award: Understanding hydro-mechanical coupling mechanism of wetted granular matters beyond the pendular regime
Funding Agency: Army Research Office
Duration: 9/1/2015-8/31/2018
Amount: $150,000 from ARO ($347,000 including cost sharing)
PI: **W.C. Sun**

19. Title: Cryo-mechanics of unsaturated frozen soils during freeze-thaw cycle
Funding Agency: Army Research Office, Department of Defense
Duration: 9/1/2015-9/1/2017
Amount: $108,889
PI: **W.C. Sun**

20. Title: A multiscale analysis on the moisture effect of dynamics responses of granular matters
Funding Agency: Army Research Office
Duration: 1/1/2015-9/1/2015
Amount: $50,000
PI: **W.C. Sun**

21. Title: Phase field modeling of anisotropic damages in orthotropic material
Funding Agency: Sandia National Laboratories
Duration: 1/1/2016-7/31/2017
Amount: $30,000
PI: **W.C. Sun**

22. Title: Modeling chemical driven fractured rocks by integrating 3D printing digenesis and multiscale computations
Funding Agency: Columbia University Provost's Grants Program
Duration: 1/1/2015-12/31/2015
Amount: $25,000
PI: **W.C. Sun**

23. Title: Computational Modeling of hydraulic fracture
Funding Agency: Sandia National Laboratories
Duration: 5/25/2016-8/31/2016
Amount: $20,000 (cost sharing from Dean's office $3,478)
PI: **W.C. Sun**

24. Title: A discrete-continuum coupling method for environmental-driven fracture in rock
Funding Agency: Sandia National Laboratories
Duration: 6/1/2015-12/31/2015
Amount: $15,000
PI: **W.C. Sun**

25. Title: Adaptive phase field modeling of crack and anticrack
Funding Agency: Extreme Science and Engineering Discovery Environment (XSEDE)
Duration: 9/1/2015-8/31/2016
Amount: 50,000 Service Unit (roughly equivalent to $\$50,000$)
PI: **W.C. Sun**

26. Title: Broaden undergraduate and high school student participation for cold-region soil mechanics
Funding Agency: Army Research Office
Duration: 6/1/2020-8/31/2020 (tentative, recommended for funding on 1/16/2020)
Amount: $10,222 in total, $10,222 per year
PI: **W.C. Sun**

27. Title: Center for micromorphic multiphysics porous and particulate materials simulations within exascale computing workflows
Funding Agency: National Nuclear Security Administration
Duration: 6/1/2020-5/31/2025 (tentative, recommended for funding on 1/23/2020)
Amount: $16,000,000 in total (Sun's activities: $846,868 in total)
PI: Richard A Regueiro (Colorado), co-PIs (incomplete list): Christian Linder (Stanford), Amy Clarke (Colorado School of Mine), Khalid Alshibli (University of Tennessee), Hongbing Lu (UT Dallas), **W.C. Sun** (Columbia)

28. Title: MURI: Integrating Multiscale Modeling and Experiments to Develop a Meso-Informed Predictive Capability for Explosives Safety and Performance
Funding Agency: Air Force Office of Scientific Research
Duration: 6/1/2019-5/31/2024
Amount: $7,500,000 (Sun's activities: $ 861,250)
PI: T. Sewell (University of Missouri-Columbia) , co-PI: H.S. Udaykumar (University of Iowa), D. Dlott (University of Illinois at Urbana-Champaign), C. Picu (Rennselaer Polytechnic Institute), S. Chauhuri (University of Illinois at Chicago), **W.C. Sun** (Columbia), S Baek (University of Iowa)

29. I-AIM: Interpretable Augmented Intelligence for Multiscale Material Discovery
Funding Agency: National Science Foundation
Duration: 10/1/2019-9/30/2021
PI: **W.C. Sun** Amount: $2,000,000 (Sun's activities: $ 418,000)

30. Title: GPU-accelerated computing for CUIT Habanero Cluster
Funding Agency: Columbia University
Duration: One-time equipment grant

Amount: $39,000 (with $39,000 matching fund)
PI: P. Gentine, co-PI: D. Blei, S. Agrawal, **W.C. Sun**, H. Waisman

31. Title: Purdue Workshop on Damage Mechanics Challenge
Funding Agency: Purdue University
Duration: One-time grant for workshop expense
Amount: $25,000
PI: L. Pyrak-Nolte (Purdue), co-PI: H. Yoon (Sandia), A. Bobet (Purdue), **W.C. Sun**.

32. Title: 13th World Congress in Computational Mechanics; New York, New York; July 22-27, 2018
Funding Agency: National Science Foundation
Duration: 1/1/2018-8/31/2018
Amount: $50,000)
PI: **W.C. Sun**, co-PI: J. Fish, H. Waisman

33. Title: Data-driven multiscale poromechanics – bridging scales and physics through graph-based machine learning with uncertainty quantification
Funding Agency: Columbia University
Duration: 1/2/2017-8/31/2017
Amount: $70,000
PI: **W.C. Sun**, co-PI: Q. Du

34. Title: A Combined experimental and theoretical investigation of reactive flow in brittle media with applications to solid earth geodynamics
Funding Agency: National Science Foundation
Duration: 8/1/2015-7/31/2018
Amount: $409,036 (Sun's activities: $34,298)
PI: M. Spiegelman , co-PI: **W.C. Sun**, H. Savage, P. Kelemen

35. Title: STTR: Particulate Composite Mixing Processes
Funding Agency: Air Force Office of Scientific Research
Duration: 2/1/2016-1/31/2018 Amount: $414,000 (Sun's activities: $182,896)
PI: H. Yin, co-PI: **W.C. Sun**

36. Title: Collaborative Research: Alteration of mantle peridotite: Geochemical fluxes and dynamics of far from equilibrium transport
Funding Agency: National Science Foundation
Duration: 8/1/2015-7/31/2018
Amount: $1,968,362
(Sun's activities: $68,589)
PI: P. Kelemen, co-PI: **W.C. Sun**, H. Savage, M. Stute, M. Spiegelman

37. Title: Experimental and digital rock physics in relation to hydraulic and electrical transport properties of porous sandstone
Funding Agency: Hong Kong Research Council
Duration: 6/1/2015-12/31/2015
Amount: $160,530 (Sun's activities: $20,000)
PI: T.F. Wong, co-PI: **W.C. Sun**

Student and Postdoctoreal Scholar Advising

On average, the research group graduates one PhD student graduated per year. In total, 10 PhD students graduated; 9 of the 10 students are solely advised by the PI. As of August 2025, 12 former group members (5 PhD students and 7 postdocs) obtained faculty positions (Northwestern University (Bahmani), McMaster (Na), Case Western (Suh), Rutgers (Vlassis), Chinese Academy of Sciences (C. Liu), Southeast University (Ma), the University of Hong Kong (Choo), Korea Advanced Institute of Science & Technology (Choo), Inha University (Korea) (Na), Northeastern (Y. Liu), Rowan University (YX. Liu), the University of Kassel (Germany)(Heider)). One PhD graduate (Bryant) joined national laboratory (Los Alamos as research scientist level-2), two former graduate joins industry (Apple (Q. Yin) and Exxonmobil (K. Wang)). Six former postdoc obtained tenure (Ma, C. Liu, Heider, Choo, Zhang, Tong), one former postdoc obtained full professorship (Heider).

Postdoctoral Research Scientist (current team member)

1. Yingxiao Liu, PhD (Stanford University, *Computational mechanics for frozen soils*, Summer 2023-current. Incoming assistant professor of Civil and Environmental Engineering, Rowan University.

Graduate Students (current team members)

1. Nhon Ngoc Phan, PhD student, *Graph, group and manifold learning for computationhal mechanics*, pre-qualification exam, Fall 2020-current.
2. Georgios Barkoulis Gavris, PhD student, *Geometric learning for mechanics under extreme conditions*, Fall 2022-current.
3. Huijian Cai, PhD student, , *Geometric deep learning for energetic materials*, pre-qualification exam, Fall 2023-current.
4. Shiqi Zheng, PhD student, *Foundation model for solid mechanics*, pre-qualification exam, Fall 2024 - current.

Associate Research Scientist (past team member)

1. Yousef Heider, PhD, now full professor of Artificial Intelligence in Mechanics (KI in der Mechanik) at the Institute of Mechanics, Faculty of Mechanical Engineering, University of Kassel, *Machine learning for solid mechanics*, Fall 2018-Fall 2020.
2. Ran Ma, PhD (University of Tennessee), now associate professor at Southeast University (China), *Computational crystal plasticity of reconsolidated salt*, Fall 2018-Spring 2022.

Postdoctoral Research Scientist (past team member)

1. Hyoung Suk Suh (Columbia University), *Computational microporomechanics for phase-changing geological materials*, Fall 2022 - Fall 2023 (now assistant professor at Case Western Reserve University).
2. Nikolaos N. Vlassis (Columbia University), *Toward trustworthy geometric deep learning for elastoplasticity problems*, Fall 2022-Spring 2023 (now assistant professor at Rutgers).
3. Qing Yin, PhD (Stanford University), now senior research and development engineer, Apple, *Data-driven plasticity for frozen soil*, Spring 2021 - Fall 2023

4. Camilo Alberto Durate Cordon, PhD (Purdue University), *Data-driven modeling of energetic materials*, Spring 2022-Spring 2023.
5. Chuanqi Liu (Tsinghua University), now professor at Chinese Academy of Sciences, *Contact problems for immersed MPM meothd*, Fall 2018-Spring 2020.
6. Guodong Zhang, PhD, (University of Notre Dame), now associate professor at Southeast University (China), *Fast Fourier solver for geomechanics problems*, Spring 2020.
7. Jinhyun Choo, PhD (Stanford), now assistant professor in the department of civil and environmental engineering at Korea Advanced Institute of Science and Technology), *Multiscale damage-plasticity of geological materials*, Fall 2016-Fall 2017.
8. Chukwudi Chukwudozie (Louisiana State University, last known position: intern at Exxonmobil), *High-strain-rate responses of geomaterials*, Fall 2017-Spring 2018.
9. Qi Tong, PhD (UC Berkeley, last known position: associate professor at Fudan University), coadvised with Professor Huiming Yin, *discrete element simulations of granular mixing*, Summer 2016-Fall 2016.

PhD Graduate (past team members)

1. Jarett Stephen Lo Poliner, PhD student, *Generative modeling with sparse data for solid mechanics*, Fall 2020-Summer 2025.
2. Mian Xiao, PhD candidate, *Learning non-Euclidean representation for solid mechanics*, Fall 2020-Spring 2025.
3. Zeyu Xiong, PhD candidate, *Nonlinear dimension reduction with neural kernel for path-dependent solid mechanics problems*, Fall 2020-Fall 2024.
4. Bahador Bahimani, PhD graduate, *Geometry-informed data-driven mechanics* , Fall 2019-Fall 2023 (now assistant professor at Northwestern University).
5. Hyoung Suk Suh, PhD graduate, *Computational microporomechanics for phase-changing geological materials*, Fall 2018 - Fall 2022 (now assistant professor at Case Western Reserve University).
6. Nikolaos N. Vlassis, PhD graduate, *Toward trustworthy geometric deep learning for elasto-plasticity problems*, Summer 2017-Summer 2021 (now assistant professor at Rutgers).
7. Eric C. Bryant, PhD graduate, *Capturing evolving size-dependent anisotropy from brittle fracture to plasticity for geological materials*, Fall 2016-Spring 2020 (now Harold Agnew National Security Postdoctoral Fellow at Los Alamos National Laboratory).
8. Kun Wang, PhD graduate *From multiscale modeling to meta-modeling of fluid-infiltrating porous media.* Spring 2015-Spring 2019 (now computational physicist at ExxonMobil Research and Engineering Company).
9. SeonHong Na, PhD graduate, (now assistant professor in the department of civil and environmental engineering at McMaster University), *Multiscale thermo-hydro-mechanical-chemical coupling effects for fluid-infiltrating dual-porosity crystalline solids and geomaterials: theory, implementation, and validation.* Fall 2014- 2018.
10. Yang Liu, PhD graduate (now assistant professor in the department of mechanical and industrial engineering at Northeastern University), *Modeling shear bands with multiscale DEM-FEM coupling method in loose and dense grain assemblies.* Spring 2014-Summer 2015.

MS Graduate (past team members)

1. Chulmin Kweon, PhD student, *Machine learning plasticity for UMAT*, Spring 2022-Spring 2024.
2. Alberto Martini, MS graduate, *Computational plasticity for reconsolidated rock salt*, Fall 2016-December 2016 (last known employment: Eng.ScD student in Professor Maria Feng's group).
3. Weiyi Li, MS student, *Particulate methods for unsaturated granular materials*, Fall 2016-Spring 2017 (PhD student in Porfessor Marco Giometto's group since 2017).
4. Zhijun Cai, MS graduate, *Adaptive Arlequin Mechanics*. Fall 2014-Spring 2016 (last known employment: CFD engineer at Schuco USA).
5. Qi Wang, MS graduate, *Microstructural attributes and effective conductivity of Fontainebleau sandstone*. Spring 2014-Spring 2015 (now structural engineer at Patuxent Engineering Group).
6. Xian Zhang, MS student, *Multi-phase field method for fluid-driven fractures*. Fall 2015-Spring 2016 (last known employment: PhD student in Martin Ostoja-Starzewski's research group at UIUC).
7. Francisco J. Contreras, MS student, *Membrane effect on triaxial compression tests*. Fall 2015-Summer 2016.

Undergraduate Researchers

1. Emma Liebowitz, Undergraduate research student, *Deep reinforcement learning for symobolic regression for hyperelasticity problems*, Summer 2021.
2. Mark Bereck, Undergraduate research student, *Deep reinforcement learning for symobolic regression for hyperelasticity problems*, Summer 2021.
3. Duy Van Tran, Undergraduate research student, *Convolutional neural network for adpative mesh refinement for path-dependent problems*, Fall 2020.
4. Nhon Ngoc Phan, Undergraduate research student, *Convolutional neural network for adpative mesh refinement for path-dependent problems*, Fall 2020.
5. Elizabeth Rossi, Undergraduate research student, *Machine learning for traction-separation law*, Fall 2020.
6. Tracy Paltoo, Undergraduate research student, *wettability of porous media*. Fall 2018.
7. Imer Jasiel del Cid, Undergraduate research student, *Micro-structural attributes of sandstone with low porosity*. Fall 2014-Spring 2015 (now engineer at Boeing).
8. Efram J. Stone, Undergraduate research student, *Micro-structural attributes of sandstone with low porosity*. Summer 2014 (now master student at University of Southern California).
9. Steven M. Lowinger, Undergraduate research student, *Application of graph theory for double-porosity system*, Fall 2015-current.
10. Ji Hoo Woo, Undergraduate research student, *Experimental mechanics of thawing soil*, Fall 2016-current

High School Summer Interns

1. Daniel Lyalin (Stuyvesant High School), *Army Educational Outreach Program*, Summer 2020 & Summer 2021.

2. Sophia Wang (Amit Regional High School), *Army Educational Outreach Program*, Summer 2019.
3. Brooke Lauren (Mother Seton Regional High School), co-advised with PhD student Eric Bryant, *Army Educational Outreach Program*, Summer 2018.
4. Anish Avasthi (Woodlands High School), co-advised with PhD student Eric Bryant, *Army Educational Outreach Program*, Summer 2018.

Short Term Visiting Students (from other universities)

1. Joep Storm (TU Delft, Netherland), Visiting student, *Mixture of experts for multiscale phase field modeling*, 3/2024-4/2024.
2. Karl Kalina (TU Dresden, Germany), Visiting student, *Machine learning constitutive modeling*, 6/2023-12-2023.
3. Jan-Hendrik Bastek (ETH Zurich, Switzerland), Visiting student, *Physics-informed denoising diffusion*, 9/2023-12-2023
4. Alessandro Milleri (University of Perugia, Italy), Visiting student, *Undrained stress path of frozen sand*, 10/2018-03/2019.
5. Nico De Marchi (University of Padova, Italy), Visiting student, *Shear wave splitting in anisotropic rock*, 09/2018-02/2019.
6. Feng Du, (China University of Mining and Technology-Beijing, China), Visiting Student, *Digial rock physics for dual-porosity media*, 09/2018-09/2019.
7. Yingfeng Sun (China University of Mining and Technology-Beijing, China), Visiting Student, *Digial rock physics for dual-porosity media*, 09/2017-09/2018.
8. Xinran Zhong (Tongji University, China), Visiting Student, *Proper orthogonal decomposition method for poroelastic shell*, 9/2016-09/2018.
9. Haohui Xin (Tongji University, China), Visiting Student, *Multiscale modeling of selective laser sintering*, 9/2015-8/2017.
10. Xin Qin (Tsinghua University, China), Visiting Student, *Proper orthogonal method for dynamic responses of soil*, 9/2016-9/2017.
11. Yingfeng Sun (China University of Mining and Technology, China), Visiting Student, *Multiphase lattice-Boltzmann simulations of dual-porosity porous media*, 12/2016-12/2017.
12. Luca Tassini (University of Perugia, Italy), Visiting Student, *Climate-controlled undrained triaxial compression tests for freezing and thawing soils*, 2/2016-8/2016.
13. Federica Ronchi (University of Perugia, Italy), Visiting Student, *Thermo-hydro-mechanical coupling effect of thermal hardening/softening of soil*, 2/2015-6/2015.
14. Guang Liu (Wuhan University), Visiting Student, *Discrete Element Modeling of Hydraulic Fracture*, 9/2014-8/2015.
15. Zhilin Liu (Nanjing University of Science and Technology), *Meshless method for predicting off-road mobility of vechicle*, 9/2015-9/2016.
16. Ning Liu (Bei-Hang University), *Microstructural modeling of reconsolidated salt*, 9/2015-10/2016.
17. Fadi Abdelijawad (Princeton University), Summer Internship at Sandia National Laboratories (co-advised with Dr. James W Foulk, III), *Localized diffusion in hydrogen embrittled steel.* Summer 2012.

Service to University and Scientific Communities

Technical Committee and Editorial Board Membership

- Editor, International Journal for Numerical Methods in Engineering, since 2025.
- Editor, Data-Centric Engineering, Cambridge University Press, 2021 - 2024.
- Associate Editor, Computer Modeling in Engineering and Sciences, since 2018.
- Editorial Board Member, International Journal for Multiscale Computational Engineering, since 2016.
- Editorial Board Member, Acta Geotechnica, 2021-current.
- Editorial Board Member, Computer and Geotechnics, 2022-current.
- Editorial Board Member, International Journal for Numerical and Analytical Methods in Geomechanics, since 2024.
- Editorial Board Member, Finite Elements in Analysis and Design, since 2025.
- Guest Editor (Physics-based Machine Learning for Computational Mechanics: Current Trends and Open Problems), International Journal for Numerical Methods in Engineering, 2025.
- Guest Editor (Computational Poromechanics), International Journal for Multiscale Computational Engineering, 2016.
- Guest Co-editor, ASCE Journal of Engineering Mechanics (special collection on machine learning enabled modeling and discovery for engineering mechanics), 2022.
- Guest Co-editor, Computer and Geotechnics (special issue on machine learning and data-driven geomechanics), 2022.
- Guest Co-editor, Granular Matter (special issue on physics-informed artificial intelligence for granular matter), 2022-2023.
- Guest Co-editor, International Journal for Numerical and Analytical Methods in Geomechanics (special issue on Machine Learning in Geomechanics), since 2024.
- Guest Co-editor, with Gregory Wagner (Northwestern) and Miugel Bessa (TU Delft), Data-driven computational Modeling and simulations, Computer Modeling in Engineering and Sciences, 2018.
- Guest Co-editor, with Christian Linder (Stanford) and Leon Mishnaevsky (TU Denmark), Multiscale Multiphysics modeling of materials, International Journal for Multiscale Computational Engineering, 2018.
- Guest Co-editor (Physics-informed artificial intelligence for granular matter), with Antoinette Tordesillas, Granular Matter, 2021-2023.
- Members-at-large, Committee on Novel Methods in Computational Engineering and Sciences, the US Association of Computational Mechanics, 2019-2023.
- Member, Committee on Multi-Scale, Multi-functional Materials and Structures, the US Association of Computational Mechanics, 2019-2021.
- Member, Committee on Computing in Applied Mechanics, the US Association of Computational Mechanics, since 2019.

- Member, 2022 General Awards Committee, International Association of Computational Mechanics, since 2022.
- Founding Vice Chair (2020), Chair (2021-2022) Machine Learning in Mechanics, ASCE Engineering Mechanics Technical Committee.
- Founding Co-Chair, Committee on Energy and Earth System, the US Association of Computational Mechanics, since 2024.
- Committee Member, ASCE Engineering Mechanics Technical Committee (Computational Mechanics, Granular Mechanics, Elasticity, Poromechanics), since 2015.
- Committee Member, ASCE Geo-institute, Computational Geotechnics Committee, since 2016.

Reviewer of the following peer-reviewed journal articles

- Acta Geotechnica
- ASCE Journal of Engineering Mechanics
- ASCE Journal of Geotechnical and Geoenvironmental Engineering
- Computer and Geotechnics
- Computational Particle Mechanics
- Computational Mechanics
- Computer Methods in Applied Mechanics and Engineering
- European Journal of Mechanics A/Solids
- European Journal of Civil Engineering
- Finite Elements in Analysis and Design
- Granular Matters
- Géotechnqiue
- International Journal of Fracture
- International Journal for Multiscale Computational Engineering
- International Journal for Numerical and Analytical Methods in Geomechanics
- International Journal for Numerical Methods in Engineering
- International Journal of Engineering Science
- International Journal of Solids and Structures
- International Journal of Plasticity
- International Journal of Solids and Structures
- Journal of Computational Physics
- Journal of Fluid Mechanics
- Journal of Geophysical Research (Solid Earth)
- Journal of the Mechanics and Physics of Solids
- Meccanica
- Mechanics Research Communications

- Nature Scientific Reports
- Proceedings of the National Academy of Sciences of the United States of America
- Soil Dynamics and Earthquake Engineering
- the Geological Society of America Bulletin

Reviewer for the conferences and professional meeting

- 51th US Rock Mechanics/Geomechanics Symposium, San Francisco, 2017.
- Engineering Mechanics Institute International Conference, Hong Kong, 2015.
- Engineering Mechanics Institute Conference, Stanford, California, 2015.
- ASCE GeoFlorida 2010: Advances in Analysis, Modeling and Design, Florida, 2010.
- The Thirteenth International Conference on Learning Representations, 2024.

Reviewer of grant proposals for the following agencies (as ad-hoc reviewers or panel members)

- U.S. Army Corps of Engineers
- U.S. Army Research Laboratories
- US Army Research Office
- U.S. National Science Foundation (Division of Civil, Mechanical and Manufacturing Innovation, Division of Earth Sciences, Division of Computer and Information Science and Engineering)
- U.S. Department of Energy
- Columbia University
- Hong Kong Research Council
- German Research Foundation (Deutsche Forschungsgemeinschaft)
- European Union Liaison Office (Cellule Europe)
- Polish National Science Center
- Swiss National Science Foundation
- Irish Research Council
- Czech Science Foundation

Committee and panelist for awards

- General Award Committee, the United States Association for Computational Mechanics, 2025.
- General Award Committee, International Association for Computational Mechanics, 2022 & 2023.
- da Vinci Award Medal Committee, ASCE Engineering Mechanics Institute, 2022 (for the 2023 cycle).

Organizer or co-organizer of domestic and international conferences and professional meetings

- Co-chair, Machine Learning and Digital Twins for Computational Science and Engineering, San Diego, 2021.
- Track chair, Mechanical Engineering, Engineering Mechanics and Civil Engineering, 2020, Machine Learning in Science and Engineering Conference, Columbia University, New York City, 2020.
- Co-chair & member of Local Organizing Committee, ASCE Engineering Mechanics Conference New York City, 2020.
- Chair, Local organization committee of World Congress of Computational Mechanics, New York (2018).
- Member, Scientific Committee, 18th U.S. National Congress on Computational Mechanics, Chciago, IL, 2025.
- Member, Scientific Committee, 17th U.S. National Congress on Computational Mechanics, Albuquerque, NM, 2023.
- Member, Technical Program Committee, 16th U.S. National Congress on Computational Mechanics, online, 2021.
- Member, International Advisory Board, 2nd International Conference on Energy Geotechnics, La Jolla, CA, 2020.
- Member, Organizing Committee, 5th Rock Mechanics/Geomechanics Symposium, New York City (2019).
- Member, Organizing Committee, 5th International Workshop on Rock Physics, Hong Kong (2019).
- Member, Scientific Organizing Committee, 15th US National Congress on Computational Mechanics, Austin, Texas (2019).
- Member, Scientific Organizing Committee, Engineering Mechanics Institute Conference, Caltech, Pasadena (2019).

Organizer or co-organizer of mini-symposia

- Co-organizer, Mini-symposium on Physics-guided and data-driven predictions for solid mechanics, 18th U.S. National Congress on Computational Mechanics, Chciago, IL (2025).
- Co-organizer, Mini-symposium on Computational Geomechanics, Engineering Mechanics Institute Conference, Anaheim, California (2025).
- Co-organizer, Mini-symposium on Data-Driven Computational Solid and Geological Mechanics, 17th U.S. National Congress on Computational Mechanics, Albuquerque, NM (2023).
- Co-organizer, Mini-symposium on Immersed/Unfitted Discretizations in Computational Mechanics: Mathematics, Algorithms, and Applications, U.S. National Committee for Theoretical and Applied Mechanics (USNC/TAM), Austin, Texas (2022).
- Co-organizer, Mini-symposium on Trustworthy augmented intelligence and data-driven material modeling, U.S. National Committee for Theoretical and Applied Mechanics (USNC/TAM), Austin, Texas (2022).
- Lead organizer ,Mini-symposium on Computational Geomechanics, 15th US National Congress on Computational Mechanics, Austin, Texas (2019).

- Co-organizer ,Mini-symposium on Crystalline and Anisotropic Rock Mechanics, Engineering Mechanics Institute Conference, Caltech, Pasadena (2019).
- Co-organizer, Mini-symposium on Computational Geomechanics, Engineering Mechanics Institute Conference, Caltech, Pasadena (2019).
- Co-organizer, Mini-symposium on Additive Manufacturing and Digital Rock Physics for Granular and Fractured Materials, 20th International Conference on Fluid Flow Problems (FEF-2019), Northwestern University, Evanston (2019).
- Co-organizer, Damage Mechanics Challenge Workshop, Purdue University (2019).
- Co-chair, Geomechanics and Geomaterials Track, Engineering Mechanics Institute Conference, Caltech, Pasadena (2019).
- Chair, Planning Team, Workshop on Verification and Validation of Computational Models Associated with the Mechanics of Materials, the Minerals, Metals and Materials Society (2018).
- Lead organizer, Minisymposium on Computational Geomechanics, Computational Geomechanics Mini-symposium at Engineering Mechanics Institute Conference, Boston (2018).
- Lead organizer, Computational Geomechanics Mini-symposium at 18th US National Congress of Theoretical and Applied Mechanics, Northwestern University (2018).
- Co-organizer, International Symposium on Multiscale Computational Analysis of Complex Materials, Copenhagen/Lyngby, Denmark (2017).
- Primary convener, Data-driven and theoretical approaches for modeling, prediction, analysis of thermo-hydro-mechanical behaviors of frozen soil and rocks, AGU Fall Meeting 2017 (2017).
- Lead organizer, Computational Geomechanics Mini-symposium at 14th US National Congress on Computational Mechanics, Montreal, Canada (2017).
- Lead organizer, Computational Geomechanics Mini-symposium at Engineering Mechanics Institute Conference, San Diego (2017).
- Co-organizer, Mini-symposium on Fluid- and chemical-driven fractures of porous media, AGU Fall Meeting, San Francisco (2016).
- Lead Organizer, Failure and instabilities in soft materials and geomaterials Mini-symposium at the 7th International Conference on Computational Methods, Berkeley (2016).
- Co-organizer, Mini-symposium on Multiscale multiphysical process in fractured rock and modeling of coupled transport phenomena in fracture networks, AGU Fall Meeting, San Francisco (2016).
- Co-organizer,Symposium on Computational Mechanics of Materials and Structures, University of Maryland, College Part Marriott Hotel and Conference Center (2016).
- Lead organizer, Computational Geomechanics Mini-symposium at Engineering Mechanics Institute Conference, Vanderbilt University, Nashile (2016).
- Lead organizer, Digital Rock and Granular Physics, Engineering Mechanics Institute Conference, Stanford University (2015).
- Lead organizer, Multiscale Modeling of Granular Materials, 13th US National Congress on Computational Mechanics, San Diego (2015).
- Lead organizer, Multiphysical Modeling of Geomaterials, 13th US National Congress on Computational Mechanics, San Diego (2015).

- International scientific committee member of the Engineering Mechanics Institute International Conference at Hong Kong Polytechnic University (2015).
- Lead organizer, Digital Rock Physics, 3D printing and More, Mineral and Rock Physics Sessions, AGU 2014 Fall Meeting, San Francisco (2014).
- Lead organizer, Computational Geomechanics Mini-symposium at United States National Congress of Theoretical and Applied Mechanics at Michigan State University (2014).

Thesis Defense and Examination Committees

- PhD graduate candidate at Columbia University (as primary advisor)
  - Yang Liu, Civil Engineering and Engineering Mechanics, August 2015.
  - SeonHong Na, Civil Engineering and Engineering Mechanics, July 2017.
  - Kun Wang, Civil Engineering and Engineering Mechanics, October 2018.
  - Eric Bryant, Civil Engineering and Engineering Mechanics, June 2019.
  - Nikolaos Vlassis, Civil Engineering and Engineering Mechanics, June 2021.
  - Hyoung Suk Suh, Civil Engineering and Engineering Mechanics, June 2022.
  - Bahador Bahmani, Civil Engineering and Engineering Mechanics, October 2023.
  - Zeyu Xiong, Civil Engineering and Engineering Mechanics, January 2025.
  - Mian Xiao, Civil Engineering and Engineering Mechanics, June 2025.
  - Jarett Poliner, Civil Engineering and Engineering Mechanics, August, 2025.
  - Nhon Phan, Civil Engineering and Engineering Mechanics, December 2025 (tentatively scheduled).
- **PhD graduate candidate at Columbia University (not served as primary advisor)**
  - Daniel Marasco, Civil Engineering and Engineering Mechanics, May 2014.
  - Abdulhamit Sarac, Mechanical Engineering, May 2014.
  - Lingqi Yang, Civil Engineering and Engineering Mechanics, December 2014.
  - Shuoshuo Han, Earth and Environmental Science, January, 2015.
  - Raha Hakimdavar, Civil Engineering and Engineering Mechanics, January 2016.
  - Zifeng Yuan, Civil Engineering and Engineering Mechanics, January 2016.
  - Po-Chieh Liu, Civil Engineering and Engineering Mechanics, June 2016.
  - Nan Lu, Civil Engineering and Engineering Mechanics, August 2016.
  - Mostafa Mobasher, Civil Engineering and Engineering Mechanics, May, 2017.
  - Dimitrios Fafalis, Civil Engineering and Engineering Mechanics, September 2017.
  - Lei Xu, Civil Engineering and Engineering Mechanics, November 2017.
  - Nandan Hara Shetty, Civil Engineering and Engineering Mechanics, November 2017.
  - Yang Jiao, Civil Engineering and Engineering Mechanics, January 2018.
  - Breannan Smith, Computer Science, February 2018.
  - Yunzhe Tao, Applied Mathematics, November, 2018.
  - Siyan Wang, Civil Engineering and Engineering Mechanics, 2018.
  - Peter Yichen Chen, Computer Science, July 2019 (qualification), July 2022 (defense).
  - Raymond Yun Fei, Computer Science, July 2019.

* Lompros Svolos, Civil Engineering and Engineering Mechanics, January 2020.
* Lei Shi, Mechanical Engineering, October 2020.
* Hwi Lee, Applied Mathematics, March, 2021.
* Kangrui Ruan, Civil Engineering and Engineering Mechanics, August 2024.
* Zhaobin Mo, Civil Engineering and Engineering Mechanics, November 2024.
* Vijendra Gupta, Civil Engineering and Engineering Mechanics, November 2024.
* Gurpreet Singh Hora, Civil Engineering and Engineering Mechanics, April 2025.

– **Thesis Committee and Reader (External)**

* Ritesh Gupta, experimental investigation on 3D printed particles to study grain geometry effect on mechanical response (MS Thesis), Universit'e Grenoble Alpes, June 2016.
* Ines Wollny, ALE formulation of inelastic temperature-dependent and fluid-infiltrated layered pavement structures at loading by steady state rolling tires (PhD Thesis), TU Dresden, January 2018.
* Alexander Fuchs, On the numerical multiscale analysis of mined based composites using Machine Learning (PhD Thesis), TU Dresden, December 2020.
* Yang Zhao, TBA (PhD Thesis), Stanford University, May 2021.
* Wei Alex Chen (Qualification Exam), Stanford University, November 2021.
* Alexandre Guevels (PhD Thesis), Duke University, November 2021.
* Hao Gao (PhD Thesis), Norwegian University of Science and Technology, 2021.
* Yitao Qiu (PhD Thesis), Physics and machine learning based approaches to model energy storage systems, Stanford University, November 2023.
* Daniel Chou, Deep learning characterization and mechanical ranking of microstructure features in geomechanics (PhD Thesis), Cornell University, October 2024.
* Jan-Hendrik Bastek, Data- and Physics-Driven Deep Learning for Forward and Inverse Problems in Computational Mechanics, ETH Zurich, Switzerland, November 2024.
* Ehsan Ghane, Learning from data and physics for multiscale modeling of woven composite, Department of Physics – Gothenburg University, Sweden, June 2025.

Department Committee Assignment and Other Services to Columbia University

– Head, Faculty Search Committee, Department of Civil Engineering and Engineering Mechanics, 2023-2024.

– Member, Faculty Search Committee, Department of Civil Engineering and Engineering Mechanics, 2016.

– Member, Graduate Admission Committee, Department of Civil Engineering and Engineering Mechanics, 2016-current.

– Academic Advisor, Master Students in Civil Engineering and Construction Management Concentrations, Department of Civil Engineering and Engineering Mechanics, 2014-current.

– Guest Lecturer, Inside Engineering Lab Visits (for Academy of the Holy Angels from New Jersey), 2017.

– Organizer (with Marco Giometto), organizer of department seminar, Department of Civil Engineering and Engineering Mechanics, 2021-current.

- Reviewer, SEAS SIR Seed Fund program (Columbia University), 2018, 2019, 2021.
- Member, Artificial Intelligence Working Group, 2020-current.
- Reviewer, RISE program (Columbia University), 2018, 2019.
- Panelist for the SEAS CAREER Award workshop, 2021.
- Reviewer, ad hoc Promotion and Tenure committee (SEAS Columbia), 2021.
- Member, Cost Committee (SEAS Columbia), 2021.

Conference Presentations

1. B. Bahmani, **W.C. Sun**, Hyperelastic symbolic model discovery guided by polyconvex neural additive representation, ASCE Engineering Mechanics Institute conference, Chicago, Illinois, 2024.
2. G. Barkoulis Gavris, **W.C. Sun**, Topological optimization with graph neural network enabled thresholding, ASCE Engineering Mechanics Institute conference, Chicago, Illinois, 2024.
3. M. Xiao, **W.C. Sun**, A MPM Lagrangian-Eulerian hydrocode for simulating buried explosions in transversely isotropic geomaterials, ASCE Engineering Mechanics Institute conference, Chicago, Illinois, 2024.
4. M. Xiao, **W.C. Sun**, Graph Isomorphism learning for geometrically nonlinear shell, Advances for Computational Mechanics Conference for Professor Tom Hughes' 80th birthday, Austin, Texas, 2023 (Invitation only).
5. N.N. Vlassis, **W.C. Sun**, K. Alshibli, R.A. Regueiro, Synthesizing realistic sand assemblies with denoising diffusion in latent space, Advances for Computational Mechanics Conference for Professor Tom Hughes' 80th birthday, Austin, Texas, 2023 (Invitation only).
6. M. Xiao, **W.C. Sun**, Geometric prior of yielding manifolds and the local closest point projection for non-smooth/non-convex plasticity, ASCE Engineering Mechanics Institute conference, Baltimore, Maryland, 2022.
7. N. Vlassis, **W.C. Sun**, Graph embedding plasticity for granular solids, ASCE Engineering Mechanics Institute conference, Baltimore, Maryland, 2022.
8. B. Bahmani, **W.C. Sun**, Manifold embedding data-driven elasticity, ASCE Engineering Mechanics Institute conference, Baltimore, Maryland, 2022.
9. N. Vlassis, **W.C. Sun**, Graph embedding plasticity for solids with complex microstructures, 19th U.S. National Congress on Theoretical and Applied Mechanics, Austin, Texas, 2022.
10. B. Bahmani, **W.C. Sun**, Manifold embedding model-free elasticity, 19th U.S. National Congress on Theoretical and Applied Mechanics, Austin, Texas, 2022.
11. Q. Yin, J. Poliner, **W.C. Sun**, Deep reinforcement learning enabled design-of-experiments for path-dependent solids with live decision makings, 19th U.S. National Congress on Theoretical and Applied Mechanics, Austin, Texas, 2022.
12. H.S. Suh, **W.C. Sun**, An immersed phase field model for coupled Darcy-Stokes flow with evolving interface, 2nd International Conference on Energy Geotechnics, La Jolla, California, 2022.

13. H.S. Suh, **W.C. Sun**, Multi-phase-field approach for modeling ice lens growth and thaw in frozen soil, 2nd International Conference on Energy Geotechnics, La Jolla, California, 2022.
14. K. Wang, **W.C. Sun**, A Non-cooperative Game for Automated Training, Validating Constitutive Laws, ASCE Engineering Mechanics Institute Conference, Columbia University, 2021. [Video]
15. H. Suh, Q. Yin, **W.C. Sun**, Numerical investigation on freezing and thawing of saturated soil, ASCE Engineering Mechanics Institute Conference, Columbia University, 2021. [Video]
16. Z. Xiong, R. Ma, **W.C. Sun**, Digital rock physics via FFT Solver, ASCE Engineering Mechanics Institute Conference, Columbia University, 2021. [Video]
17. N.N. Vlassis, **W.C. Sun**, AI-generated interpretable plasticity theory, ASCE Engineering Mechanics Institute Conference, Columbia University, 2021. [Video]
18. B. Bahmani, **W.C. Sun**, An accelerated model-free poroelasticity solver with multifidelity multiphysics data, ASCE Engineering Mechanics Institute Conference, Columbia University, 2021. [Video]
19. R. Ma, **W.C. Sun**, Crystal plasticity with precipitation creeping, crack growth and healing in rock salt, ASCE Engineering Mechanics Institute Conference, Columbia University, 2021. [Video]
20. M. Xiao, C. Liu, **W.C. Sun**, Domain partitioning MPM for thermal-mechanics contact mechanics with evolving fracture, ASCE Engineering Mechanics Institute Conference, Columbia University, 2021. [Video]
21. C. Liu, **W.C. Sun**, ILS-MPM: an implicit level-based material point method for contact mechanics, ASCE Engineering Mechanics Institute Conference, Columbia University, 2021. [Video]
22. **W.C. Sun**, K. Wang, Q. Du, A non-cooperative game for machine-learning computational mechanics, XV International Conference on Computational Plasticity. Fundementals and Applications, Barcelona, Spain, 2019.
23. K. Wang, **W.C. Sun**, Q. Du, A Cooperative Two-player Game for Data-driven Discovery of Elastoplasticity Knowledge Represented in Directed Graph, the 11th United States National Congress of Computational Mechanics (USNCCM), Austin, Texas, 2019.
24. K. Wang, **W.C. Sun**, An Adaptive Multi-phase-field Prediction Framework for Localized Failures in Geological Materials with Data-clustering, the 11th United States National Congress of Computational Mechanics (USNCCM), Austin, Texas, 2019.
25. E.C. Bryant, **W.C. Sun**, A Micromorphic-regularized Cam-clay-type Model for Capturing Size-dependent Anisotropy in Geological materials, the 11th United States National Congress of Computational Mechanics (USNCCM), Austin, Texas, 2019.
26. Y. Heider, **W.C. Sun**, Data-driven Validation of Bishop's Effective Stress Principle through Deep Reinforcement Learning, the 11th United States National Congress of Computational Mechanics (USNCCM), Austin, Texas, 2019.
27. S. Na, **W.C. Sun**, Adaptive mesh-refinement for poromechanics problems of high-order continua: a configurational force approach, Engineering Mechanics Institute conference, Caltech, Pasadena, 2019.

28. C. Liu, **W.C. Sun**, Shift domain material point method: an image-to-simulation workflow for solids of complex geometries undergoing large deformation, Engineering Mechanics Institute conference, Caltech, Pasadena, 2019.

29. N. Vlassis, **W.C. Sun**, Bootstrapping critical state plasticity models for predicting cyclic undrained responses of granular materials with a hierarchical knowledge polytree, Engineering Mechanics Institute conference, Caltech, Pasadena, 2019.

30. E. Bryant, **W.C. Sun**, A micromorphic-regularized anisotropic Cam-clay-type model for capturing size-dependent anisotropy, Engineering Mechanics Institute conference, Caltech, Pasadena, 2019.

31. R. Ma, **W.C. Sun**, A multiscale FE-FFT approach for modeling crack initiation and propagation in polycrystalline rock salt, Engineering Mechanics Institute conference, Caltech, Pasadena, 2019.

32. K. Wang **W.C. Sun**, An adaptive ensemble phase field predictions for localized failures in geological materials, Engineering Mechanics Institute conference, Caltech, Pasadena, 2019.

33. K. Wang **W.C. Sun**, Q. Du, A cooperative game for automated learning of elasto-plasticity knowledge graphs and models with AI-guided experimentation, Engineering Mechanics Institute conference, Caltech, Pasadena, 2019.

34. **W.C. Sun**, K. Wang, A meta-modeling game for automated generations of cohesive zone models, Mach Conference, the Hopkins Extreme Materials Institute, Annapolis, Maryland, 2019.

35. K. Wang, **W.C. Sun**, N. Vlassis, Computational unsaturated poromechanics enhanced by deep learning, World Congress of Computational Mechanics, New York, 2018.

36. E. Bryant, **W.C. Sun**, A modified phase field model for mixed-mode crack propagation with consistent kinematic modes, World Congress of Computational Mechanics, New York, 2018.

37. K. Wang, X. Zhong, **W.C. Sun**, Dual-basis Dimensional Reduction for Non-dissipative Explicit Dynamic Discrete Element Simulations with High-frequency Noises, World Congress of Computational Mechanics, New York, 2018.

38. S. Na, C. Chukwudozie, **W.C. Sun**, Modeling high-strain-rate responses brittle porous media with fracture opening and closure, World Congress of Computational Mechanics, New York, 2018.

39. K. Wang, **W.C. Sun**, Hybridizing neural network and hand-crafted critical state plasticity model for geomaterials in a directed graph, World Congress of Computational Mechanics, New York, 2018.

40. S. Na, **W.C. Sun**, A Multi-phase-field/Polycrystal Plasticity for the Brittle-ductile Transitions of Crystalline Rock with Precipitating Fluid, World Congress of Computational Mechanics, New York, 2018.

41. E. Bryant, **W.C. Sun**, A coupled anisotropic critical state and eigenrosion theory for capturing the anisotropic plasticity and fractures in shale, Engineering Mechanics Institute Conference, MIT, Cambridge, 2018.

42. K. Wang, **W.C. Sun**, Critical state plasticity model with data-driven hardening and flow roles, Engineering Mechanics Institute Conference, MIT, Cambridge, 2018.

43. S. Na, **W.C. Sun**, A multi-phase-field/crystal Plasticity for crystalline salt with brine inclusions, Engineering Mechanics Institute Conference, MIT, Cambridge, 2018.

44. S. Na, C. Chukwudozie, **W.C. Sun**, Modeling dynamic responses brittle porous media with fracture opening and closure, Engineering Mechanics Institute Conference, MIT, Cambridge, 2018.

45. K. Wang, **W.C. Sun**, N. Vlassis, Multiscale unsaturated poromechanics enhanced by deep learning, Engineering Mechanics Institute Conference, MIT, Cambridge, 2018.

46. J. Choo, **W.C. Sun**, Coupling phase-field and plasticity for unified modeling of brittle and ductile failures in geomaterials, Engineering Mechanics Institute Conference, MIT, Cambridge, 2018.

47. **W.C. Sun**, K. Wang, Hybrid data-drtiven multiscale computational geomechanics across length scales, US Congress of Computational Mechanics, Montreal, Canada, 2017.

48. K. Wang, **W.C. Sun**, A discrete-continuum coupling model for fractured porous media with embedded branched-discontinuities in the finite deformation range, US Congress of Computational Mechanics, Montreal, Canada, 2017.

49. S. Na, **W.C. Sun**, A combined phase field and crystal plasticity approach for capturing thermo-mechanical behavior of polycrystalline rock salt, US Congress of Computational Mechanics, Montreal, Canada, 2017.

50. E. Bryant, **W.C. Sun**, Adaptive Arlequin method for multiscale brittle fracture with subgrid length scales, US Congress of Computational Mechanics, Montreal, Canada, 2017.

51. **W.C. Sun**, K. Wang, J. Choo, S. Na, A critical assessment on phase field and eigen-erosion modeling of fractures in anisotropic fluid-infiltrating porous media, Engineering Mechanics Institute Conference, San Diego, 2017.

52. K. Wang, **W.C. Sun**, Data-driven discrete-continuum method for partially saturated porous media, Engineering Mechanics Institute Conference, San Diego, 2017.

53. K. Wang, **W.C. Sun**, Micro-polar Discrete-continuum coupling method for fluid-infiltrating porous media, Engineering Mechanics Institute Conference, Vanderbilt University, 2016.

54. S. Na, **W.C. Sun**, Computational cryo-mechanics for frozen soil, Engineering Mechanics Institute Conference, Vanderbilt University, 2016.

55. **W.C. Sun**, Z. Cai, Staggered schemes for multiscale Arlequin poromechanics problems, Engineering Mechanics Institute Conference, Vanderbilt University, 2016.

56. **W.C. Sun**, C. Tamagnini, Modeling thermal softening effects in coupled THM problems at finite strain, Engineering Mechanics Institute Conference, Vanderbilt University, 2016.

57. **W.C. Sun**, Multiscale coupling method for fluid-infiltrating porous media at the finite deformation range, Technical University of Dresden, Dresden, Germany, 2015.

58. **W.C. Sun**, Multiscale hydro-mechanical responses of geological materials, Sandia National Laboratories, Albuquerque, New Mexico, 2015.

59. O.I. Ulven, **W.C. Sun**, Fluid transport in reaction-induced fractures, European Geophysical Union General Assembly, Vienna, Austria, 2015.

60. S. Na, **W.C. Sun**, Thermo-hydro-mechanical coupling effects on wave propagation and strain localization in a softening porous medium, Engineering Mechanics Institute Conference, Stanford, California, 2015.

61. **W.C. Sun**, Z. Cai, Modeling the hydromechanical coupling process of fluid-infiltrating solids via the monolithic and operator-splitting Arlequin method, Engineering Mechanics Institute Conference, Stanford, California, 2015.

62. **W.C. Sun**, Teng-fong Wong, SeonHong Na, Kun Wang, Imer Jasiel del Cid, Mechanical, hydraulic and electrical transport properties of sandstone with multiscale lattice Boltzmann/finite element simulations on micro-tomographic and DEM-simulated images, Engineering Mechanics Institute Conference, Stanford, California, 2015.

63. **W.C. Sun**, S. Na, A finite strain thermo-hydro-mechanical model for thermal softening geomaterials, the United State National Congress on Computational Mechanics, San Diego, 2015.

64. **W.C. Sun**, K. Wang, A discrete-continuum coupling approach for predicting anisotropic damages in water-saturated brittle rocks, 2015, the United State National Congress on Computational Mechanics, San Diego, 2015.

65. **W.C. sun**, Concurrent and Hierarchical Multiscale Modeling for Strain Localization in Fluid-infiltrating Porous Solids, Department of Mechanical engineering, Columbia University, 2015.

66. **W.C. Sun**, Multiscale modeling of strong and weak discontinuities in porous media, University of Hong Kong, Hong Kong, 2015.

67. **W.C. Sun**, Concurrent and hierarchical multiscale modeling of fluid-infiltrating solids, Department Seminar, Department of Civil and Environmental Engineering, the Hong Kong University of Science and Technology, Hong Kong, 2015.

68. Y. Liu, **W.C. Sun**, K. Wang, Z. Yuan, J. Fish, A nonlocal multiscale discrete-continuum model for dynamics shear band propagations and ruptures in granular materials, Engineering Mechanics Institute International Conference, Hong Kong Polytechnic University, Hong Kong, 2015.

69. **W.C. Sun**, C. Tamagnini, Modeling deformation bands in thermal softening and fluid infiltrating porous solids at finite strain, John Rudnicki Symposium, SES Meeting, Purdue University, 2014.

70. Y. Liu, **W.C. Sun**, Predicting possible leakage due to dynamics strain localization in granular materials with a coupled continuum-discrete coupling model, SES Meeting, Purdue University, 2014.

71. **W.C. Sun**, A DEM-LBM-FEM model for the formation of a dilatant shear band, 12th Annual Northwestern Granular Materials Workshop, Brown University, 2014.

72. **W.C. Sun**, Modeling multi-physical responses of deformation bands in porous media across length scales, Itasca Consulting Group, Minneapolis, MN, USA, 2014.

73. **W.C. Sun**, M.R. Kuhn, J.W. Rudnicki, A micromehcanical analysis on permeability evolution of a dilatant shear band, ARMA 14-7626, Minneapolis, MN, 2014.

74. **W.C. Sun**, Modeling the multiscale deformation-diffusion process of fluid-infiltrating solids via the Arlequin method, IUTAM symposium, Evanston, IL, 2014.

75. **W.C. Sun**, J.T. Ostien, J.W. Foulk III, a stabilized finite element formulation for monolithic thermo-hydro-mechanical simulations at finite strain, Engineering Mechanics Institute Conference, Evanston, Illinois , 2013.

76. **W.C. Sun** Computational poromechanics across temporal and spatial scales, Department of Civil Engineering and Engineering Mechanics, Columbia University, New York, New York, 2013.

77. A. Mota, **W.C. Sun**, J.T. Ostien, J.W. Foulk III, K.N. Long, Lie-group interpolation and variational recovery for internal variables, the Third International Conference on Computational Modeling of Fracture and Failure of Materials and Structure, Prague, Czech Republic, 2013.

78. **W.C. Sun**, J.T. Ostien, J.W. Foulk III, Modeling fluid flow in deformation bands with stabilized localization mixed finite elements, AGU Fall Meeting, San Francisco, 2012.

79. T-F. Wong, **W.C. Sun**, Prediction of hydraulic and electrical transport properties of sandstone with multiscale lattice Boltzmann/finite element simulation on microtomographic images, AGU Fall Meeting, San Francisco, 2012.

80. J W. Foulk III, **W.C. Sun**, C. San Marchi, B. Somerday, D. Balch, Coupled hydrogen transport and deformation of 21Cr-6Ni-9Mn austenitic stainless steel, 2012 International Hydrogen Conference, Grand Teton National Park, Jackson Lake Lodge, Wyoming, USA, 2012.

81. **W.C. Sun**, Connections between microstructural attributes and macroscopic mechanical and hydraulic responses of deformation bands in idealized and real porous media, Center for Frontiers of Subsurface Energy Security, Sandia National Laboratories, May, 8th, Albuquerque, NM, 2012.

82. T-F. Wong, **W.C. Sun**, Y. Ji, P. Baud, MicroCT imaging of porous sandstone and limestone: Implication on permeability evolution and mechanics damage, DOE basic science workshop, April 4th-5th, Gaithersburg, MD, 2012.

83. **W.C. Sun**, J.E. Andrade, J.W. Rudnicki, P. Eichhubl, Connecting microstructural attributes and macroscopic permeability of a natural shear-enhanced compaction band using multiscale computations, American Geophysical Union Fall Meeting, San Francisco, CA, 2011.

84. **W.C. Sun**, J.E. Andrade, J.W. Rudnicki, Capturing micro-structural attributes and macroscopic fluid transport properties of two-phase porous media with multi-scale framework, 11th US National Congress on Computational Mechanics, July 25-29, Minneapolis, MN, 2011.

85. **W.C. Sun** and J.E. Andrade, Capturing the effective permeability of field compaction bands with hybrid lattice Boltzmann/finite element, World Congress of Computational Mechanics, Sydney, Australia, 2010.

86. **W.C. Sun** and J.E. Andrade, Surface Slumping of Submarine Slope And Its Relation To Material Instability, 16th US National Congress on Theoretical and Applied Mechanics, University Park, Pennsylvania, 2010.

87. **W.C Sun** and J.E. Andrade, Diffuse bifurcations of porous media under partially drained conditions, International Workshop on Multiscale and Multiphysics Processes in Geomechanics, Stanford, California, 2010.

88. **W.C Sun** and J.E. Andrade, Capturing material instability in saturated porous media, US Congress on Computational Mechanics, Columbus, Ohio, 2009.

89. J.E. Andrade, N. Lenoir, **W.C. Sun**, J.W. Rudnicki, X-ray aided permeability computations inside compaction bands in sandstones, American Geophysical Union, Fall Meeting, 2009.

90. B. Jeremic, M. Preisig and **W.C. Sun**, Seismic soil-foundation interaction: numerical modeling issues, 2005 Structures Congress, Structural Engineering Institute, New York, 2005.

91. **W.C. Sun**, OpenSees simulation tools for geotechnical earthquake engineering, PEER Annual Meeting, Menlo Creek, 2005.
92. **W.C. Sun**, OpenSees pre- and post- Processing, 2005 EERI Annual Meeting, Mexico, 2005.
93. **W.C. Sun**, OpenSees pre- and post- Processing with Application to OpenGL and FLTK, Undergraduate Research Conference, University of California, Davis, 2004.
94. M. Preisig and **W.C. Sun**, I-880 test bed simulation, 2004 PEER Annual Meeting, Palm Springs Riviera Resort, 2004.

Outreach Efforts (General Public, Media, K-12, Underrepresented Groups)

The research group has participated in Inside Engineering Lab Visits and hosted Academy of the Holy Angels from New Jersey for a site visit and guest lecture.

Secured grant from Army Research Office to host high school student for summer research in Summer 2018-2021.

Graduated one PhD student (Yang Liu) from minority group (gender) who then landed a postdoc position at MIT, followed by a tenure-track position at Northeastern.

Graduated two MS research students (Francisco Contreras and Xian Zhang) from underrepresented group.

Mentored undergraduate research students (Imer Jasiel del Cid) from minority groups who successfully provided research results in the form of a manuscript and found engineer positions at Boeing.

Recruited faculty member Professor Addis Kidane, who is from an underrepresented group, to join CEEM as a tenured faculty member. The PI has secured two new grants with Professor Kidane since he joined the department.

Lectured short course at the MMLDT-CSET conference, WCCM, and USNCCM to promote machine learning and STEM to underrepresented graduate students. Our lectures are one of the most popular short courses in WCCM Vancouver and USNCCM Albuquerque.

Participated in the ENG program and mentored two high-school students from underrepresented groups to conduct summer research in the summer of 2022.

Technical Reports

1. **W.C. Sun**, Final Report: Cryo-mechanics of unsaturated frozen soils during freeze-thaw cycle, US Army Research Office, 2018. [URL]
2. **W.C. Sun**, A multiscale analysis on the moisture effect on dynamic responses of granular matters, US Army Research Office, 2016.
3. **W.C. Sun**, A multi-scale framework for modeling instabilities in fluid-infiltrated porous solids, PhD dissertation, Northwestern University, 2011.

4. B. Jeremic, C. Zhao, M. Preisig, K. Sett, **W.C. Sun**, Geomechanics Simulation Tools for PBEE, PEER Year 8 Progress Report, Vol. II, pp. B150-B155, Pacific Earthquake Engineering Research Center, UC Berkeley, 2005.
5. B. Jeremic, J. Putnam, Z. Yang, K. Sett, C. Zhao, J. Liao, G. Jie, **W.C. Sun**, Earthquake Response of Bridge Abutment Backfill Constructed with Tire Shreds, Department of Civil and Environmental Engineering, UC Davis, 2004.

Professional and Honor Society Membership

Member, American Physical Society, 2021-current

Member, Engineering Mechanics Institute, 2014-current

Member, American Society of Civil Engineers, 2014-current

Member, American Society of Mechanical Engineers, 2014-current

Member, International Society of Porous Media, 2014-current

Member, Sigma Xi the scientific research society, 2013-current

Member, American Geophysical Union, 2010-current

Member, UC Davis Chapter, the Honor Society of Phi Kappa Phi, since 2003

Member, California Lambda Chapter, Tau Beta Pi Engineering Honor Society, since 2003

Member, UCAD Chapter, Golden Key International Honor Society, since 2003

Member, American Society of Civil Engineers, 2009