Biographical Sketch

WaiChing Sun, PhD
Associate Professor
Department of Civil Engineering and Engineering Mechanics
Columbia University, New York, NY10027
Phone: 212-851-4371
Fax: 212-854-6267

(a) Professional Preparation

University of California, Davis	Davis, CA	Civil Engineering	B.S.	2005
Stanford University	Stanford, CA	Civil Engineering	M.S.	2007
Princeton University	Princeton, NJ	Civil Engineering	M.A.	2008
Northwestern University	Evanston, IL	Applied Mechanics	PhD.	2011
Sandia National Laboratories	Livermore, CA	Mechanics of Materials	Post-doc	2013

(b) Appointments

Assistant Professor	Columbia University	Since 2014
Senior Member of Technical Staffs	Sandia National Laboratories	2013-2014
Postdoctoral Appointee	Sandia National Laboratories	2011-2013
Visiting Scholar	California Institute of Technology	2010-2011

(c) Products

(i) Five Products Most Related to the Proposed Project (* indicates students or postdoc)

1. 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.
2. 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, 2019.
3. 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*, doi:10.1016/j.cma.2018.01.036, 2018.
4. S. Na*, **W.C. Sun**, Computational thermomechanics of crystalline rock. Part I: a combined multi-phase-field/crystal plasticity approach for single crystal simulations, *Computer Methods in Applied Mechanics and Engineering*, doi:10.1016/j.cma.2017.12.022, 2018.
5. C. Liu*, **W.C. Sun**, Shift domain material point method for solids in the finite deformation range, *special thematic issue for Meshfree and Particle Methods for Modeling Extreme Loadings, Computational Particle Mechanics,* doi: 10.1007/s40571-019-00239-y, 2019.

(ii) Five Other Significant Products (* indicates students or postdoc)

1. K. Wang*, **W.C. Sun**, Q. Du, A cooperative game for automated learning of elasto-plasticity knowledge graphs and models with AI-guided experimentation, *Computational Mechanics*, 64(2):67–499, doi:,10.1007/s00466-019-01723-1, 2019.
2. E.C. Bryant*, **W.C. Sun**, A micromorphic-regularized anisotropic Cam-clay-type model for capturing size-dependent anisotropy, *Computer Methods in Applied Mechanics and Engineering,* 354:56-95, doi:10.1016/j.cma.2019.05.003, 2019.

3. 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*, doi:10.1016/j.cma.2018.01.044, 2018.
4. 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*, doi:10.1016/j.cma.2019.112572, 2019.
5. **W.C. Sun**, Z. Cai*, J. Choo*, Mixed Arlequin method for multiscale poromechanics problems, *International Journal for Numerical Methods in Engineering*, doi:10.1002/nme.5476, 2017.

(d) Synergistic Activities

Government/University/International Research Collaboration: 3-year experience as senior member of technical staff at Sandia National Laboratories (SNL), during which the PI served as the main developer of an open-source code called Albany for multi-physical numerical simulations. The ongoing research collaborations between the PI and members of SNL help the transfer of knowledge to national laboratories. The PI has also been advisors and collaborators to visiting scholars from Hong Kong, China, Italy, Denmark, Germany and Norway and has ongoing collaborations from colleagues that leads to submission and publication of peer-reviewed journals. The PI has received the following recognitions for his research achievement: **John Argyris Award** (International Association for Computational Mechanics, 2020) **NSF CAREER award** (CMMI: Mechanics of Materials and Structures) **EMI da Vinci Award** (American Society of Civil Engineers) 2018, **Zienkiewicz Numerical Methods in Engineering Prize** (Institution of Civil Engineers, 2017)**, AFOSR Young Investigator Program Award (**Air Force Office of Scientific Research, 2016)**, ARO Young Investigator Program Award,** (Army Research Office, 2015), **Caterpillar Best Paper Prize** (Springer-Verlag Berlin Heidelberg, 2014)**.**

Research Outreach: The PI has served as an invited speaker for department seminars at universities and industry over 50 times at various universities (MIT, Harvard, Cornell, Princeton, and Stanford), companies (ExxonMobil, Shell), and national laboratories (Sandia, Los Alamos, Lawrence Livermore, …etc)

Service to the Research Community: The PI served as organizer and co-organizer of more than 20 mini-symposium at various conferences. He also served as anonymous reviewer of more than 20 peer-reviewed journals, and as reviewer or review panelist to Army Crops of Engineering, Army Research Office and National Science Foundation. Currently, he serves as one of the editorial board members for International Journal of Multiscale Computational Engineering, and also as committee member of the computational geotechnics committee for ASCE Geo-institute, computational mechanics, elasticity and granular mechanics committee for the ASCE Engineering Mechanics Institute.

Student Mentoring: The PI currently serves as a mentor and research advisor to underrepresented undergraduate students and have provide guidance to 2 master and 6 PhD students, and 3 postdoctoral research scientists working in his research group. The PI has dedicated his time on promoting diversity has regularly hosted lecture and seminar for local high school to promote STEM to underrepresented groups. Currently, the research group has graduated two PhD student who found tenure-track position at Northeastern University and at McMaster University. The former postdoc of the research group has also recently hired by University of Hong Kong as assistant professor.