

Biographical Sketch

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(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)

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.

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.

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.

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, 2017.

K. Wang*, **W.C. Sun**, A unified variational eigen-erosion framework for interacting fractures and compaction bands in brittle porous media, *Computer Methods in Applied Mechanics and Engineering*, 318:1-32, 2017.

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

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.

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, 2015.

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, *International Journal for Numerical and Analytical Methods in Geomechanics*, 37(16), 2755-2788, 2013.

W.C. Sun, A. Mota, A multiscale overlapped coupling formulation for large deformation strain localization, *Computational Mechanics*, 54(3):803-820, 2014.

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

(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: **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, including Shell (2013), UC Davis (2013), Brown University (2013), University of Illinois, Chicago (2014), University of Texas at Austin (2015), University of Hong Kong (2015), Technische Universität Dresden, Germany (2015), University of Perugia, Italy (2015), Harvard University (2016), Northwestern University (2016), Ruhr-Universität Bochum, Germany (2016), Exxonmobil (2016), MIT (2017), Georgia Institute of Technology (2017) and Princeton University (2017). He also presented regularly to domestic and international professional meetings and conferences, such as the IUTAM Symposium (2014), Annual Technical Meeting of SES, at Purdue University (2014), and Northeast Granular Material Workshop at Brown University (2014), as a discussion leader of the iMechanica Journal Club, (September 2014), and as the guest editor of a special issue on computational poromechanics for Multiscale Computational Engineering (2016) and also elected as the editorial board member in 2016. These scholarly activities promote the exchanges of scientific results.

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 15 peer-reviewed journals, and as reviewer or review panelist to Army Corps 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 4 PhD students, and 2 postdoctoral research scientist working in his research group. The PI has dedicated his time on promoting diversity and received a faculty diversity award for his work on integrating advance technology such as 3D printing to introduce science to under-privileged students and has regularly hosted lecture and seminar for local high school to promote STEM to underrepresented groups. Currently, the research group has graduated one PhD student who found tenure-track position at Northeastern University. The former postdoc of the research group has also recently hired by University of Hong Kong as assistant professor.

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