Wenbin Fei

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RESEARCH INTERESTS

- Multiscale Multiphysics (THMC) study in porous media;
- Image processing;
- Data science.

EDUCATION

PhD.   Infrastructure Engineering (Geotechnical Engineering)

The University of Melbourne 10/JAN.2017-Current

*Supervisor: **A/Prof. Guillermo Narsilio**   Co-supervisor:**Dr. Mahdi Disfani***

M.S.   Civil Engineering (Rock Engineering and Geomechanics)

Institute of Rock and Soil Mechanics, Chinese Academy of Sciences, SEPT/2011.9-JUL/2014

*Supervisor: **Prof. Qi Li**   Co-supervisor: **Prof. Yunming Yang***

GPA: 88.94/100 (3.56/4.0)

B.S.   Geological Engineering

Chang'an University, Xi'an, China (PRC "211" project university, "985"Project Innovation Platform), SEPT/ 2007-JUL/2011

GPA: 84.87/100 (3.4/4.0) GPA for the Last Two Years: 88.54/100 (3.54/4.0)

RESEARCH EXPERIENCE

JAN/2017-Current The University of Melbourne

Particle Scale Study on Fluid and Heat Flow in Granular Mixtures

- Images from CT Scanning;
- Images post-processing using ImageJ and Simpleware;
- Simulation of permeability and thermal conductivity using COMSOL and network models;
- Three-dimensional particle shape descriptors;
- Particle connectivity using complex network theory;
- Try to apply machine learning to find out the relationship between the microscale structure and transport properties under loading and diagenesis.

Effect of Chemical Reaction on the Permeability of Fractures in Deep Geothermal Reservoir

- Variation of precipitation and dissolution with the change of pore pressure and temperature;
- Fracture heterogeneity;
- Home-made C++ software to conduct THC simulation.

SEPT/2011.9-JUL/2014.7   Institute of Rock and Soil Mechanics, Chinese Academy of Sciences

Coupled Analysis of Carbon Dioxide Storage Combining with Overlying Coal Exploitation

- In China, I am the first person who develops a code ("AEEA Coupler") by linking ABAQUS **(Mechanics software)** and ECLIPSE **(Reservoir software)** to realize **THMC coupling analysis**;

- Applying submodelling technique to well stability analysis;
- Geological modeling with **Petrel**;
- Software AEEA Coupler written with **Python language**.

Numerical simulation of hydraulic fracturing

- Stress-damage model with different hydraulic and native fissures;
- Extended Finite Element Method (XFEM).

Adopting different methods to simulate the mining process

- Coal-rock viscoelastoplasticity deformation;
- Cohesive element;
- Smoothed particle hydrodynamic (SPH) method.

Survey and sampling in the Sichuan basin

- One moth field trip with *Prof. Xinglin Lei* (Geological Survey of Japan, National Institute of Advanced; Industrial Science and Technology) and *Prof. Qi Li* to see the diverse nature of the outcrops available and to understand the geological systems;
- Investigation of Puguang and Moxi gas field, to study the injection-induced seismicity in oil/gas reservoirs;
- Sampling various rock for laboratory acoustic emission experiment to further understand the load-induced failure process.

PUBLICATIONS

- **Fei W**, Narsilio G, Disfani M, Impact of three-dimensional sphericity and roundness on heat transfer in granular materials. Powder technology, 2019 (Accepted)

- **Fei W**, Narsilio G, van der linden J, Disfani M, Quantifying the impact of rigid interparticle structures on heat transfer in granular materials using networks. International Journal of Heat and Mass Transfer, 2019 (Conditionally accepted)

- **Fei W**, Li Q, Wei X, Song R, Jing M, Li X. Interaction analysis for CO2 geological storage and underground coal mining in Ordos Basin, China. Engineering Geology. 2015;196:194-209.

- Yang Y, **Fei W**, Yu H-S, Ooi J, Rotter M. Experimental study of anisotropy and non-coaxiality of granular solids. Granular Matter. 2015;17:189-96.

- **Fei W**, Li Q, Liu X, Wei X, Jing M, Song R, et al. Coupled Analysis for Interaction of Coal Mining and CO_2 Geological Storage in Ordos Basin, China. ARMS8-2014 ISRM International Symposium-8th Asian Rock Mechanics Symposium-Rock Mechanics for Global Issues-Natural Disasters, Environment and Energy. 2014. p. 2485-94.

- Li Q, **Fei W**, Liu X, Wei X, Jing M, Li X. Challenging combination of CO_2 geological storage and coal mining in the Ordos basin, China. Greenhouse Gases: Science and Technology. 2014;4:452-67.

- **Fei W**, Li Q. A Software to Analysis the Multi-physical THMC Promblems by Linking ABAQUS and ECLIPSE [AEEA Coupler], China Registration No. 2014R027901. 2013.

- Li Q, Wei Y-N, Liu G, Jing M, Zhang M, **Fei W**, et al. Feasibility of the combination of CO_2 geological storage and saline water development in sedimentary basins of China. Energy Procedia. 2013;37:4511-7.

- Zhang M, Yang Y, Li Q, Jiang M, **Fei W**. Influence of Stress Paths Including Principal Stress Rotation on Critical State of Dense Sand. Chinese Journal of Rock Mechanics and Engineering. 2013;32:2560-5.

PROFESSIONAL EXPERIENCE

FEB/2018-Current   Bamford Rock Testing Services

- Mechanical strength: Brazilian tensile, point load, uniaxial compressive and triaxial strength;
- Penetration resistance (Toughness): Goodrich drillability test and sievers J-value test
- Brittleness: Swedish brittleness number;
- Abrasiveness: CERCHAR abrasivity index.

JUE/2018-Current   Deputy lab manager of Geotechnical engineering lab in The University of Melbourne

- Lab management; Induction for lab users; Lab inspection.

May/2019- Current   Senor Tutor in The University of Melbourne

- Subject coordination, consultation, task arrangements of tutors.

JUL/2017- May/2019   Tutor in The University of Melbourne

- Seepage lab practical; Slope stability tutorial; Finite element simulation tutorial; Optimization tutorial; GeoStudio workshops.

AUG/2014-NOV/2016   China Railway Siyuan Survey and Design Group Co., LTD

Geotechnical Investigation Report

- Field survey;
- Recommend soil and rock properties;
- Recommend method to treat the poor soil and avoid geological disasters.

Experimental study of anisotropy and non-coaxiality of granular solids

- Hollow cylindrical tests;
- Using particulate materials (glass beads and polymers).

Road Bed Design

- Design of high embankment and deep cutting in mountain highway;
- Design of CFG and pipe piles in soft soil;
- Special design about sponge city construction.

Slope Design and Treatment

- Slope stability analysis using GeoStudio Slope/w and ABAQUS (SPH) ;
- Research on expansive clay slope progressive deformation mechanism of instability based on FLAC^{2D} (using **fish code** to add the expansion force) ;
- Design anchor frame beam, retaining wall or anti-slide pile to strengthening slope.

AWARDS and SCHOLARSHIPS

- Melbourne Research Scholarship   2017.01
- Outstanding Graduate   2014.06
- Merit Student of Chinese Academy of Sciences   2013.05
- Excellent Thesis of Chang'an University   2011.06
- Merit Student of Chang'an University, two times   2010.11 and 2009.12
- Single item scholarship of Chang'an University   2008.11

SKILLS

- Python language (Data science), C++ language;
- COMSOL, ABAQUS, ECLIPSE, Visage, PETREL, GeoStudio Slope/w;
- ImageJ/Fiji, Simpleware.