

Report on the Visiting Program

Visiting Researcher: Zhiming Fang, Institute of Rock and Soil Mechanics, CAS

Host: University of Queensland

Placement period: 20 June to 31 July

✓ Research proposal overview

Objective The objective of the proposed research program is to provide the leaning and training opportunities for Dr. Fang, focusing on experimental and numerical techniques associated with CO₂-geosequestration and CO₂-enhanced coalbed methane (CO₂-ECBM) recovery. The program also serves as an exchange platform to increase strategic alliances between Australian and Chinese researchers working on highly challenged and rapidly developing scientific and technical problems with CO₂ emission and climate change. It will help establishing further collaboration among the China Australia Geological Storage of CO₂ (CAGS), Wuhan Institute of Rock and Soil Mechanics (IRSM), and the University of Queensland (UQ).

Program The research program consists of three components:

1. Aiding in data collection and analysis for the relevant coalbed methane (CBM) and CO₂-enhanced CBM projects currently

- conducting in Energy & Environment research group at UQ;
2. Investigating experimental and numerical techniques for modeling the coupling process in the porous media such as CBM/ECBM recovery and CO₂ geo-sequestration.
 3. Visiting and conducting academic exchange in the Global Change Institute (GCI) and Earth Systems Science Computational Centre (ESSCC) at UQ.

Deliverables/outputs

- A report to GA on the visit
- Preliminary understanding of the ECBM simulation methods developed by UQ
- Identifying the advantages and disadvantages of UQ's experimental apparatus and comparing them with experimental apparatus developed in IRSM
- Developing possible joint project and/or joint publications for further collaboration

Learning

- Measurement techniques of coal/rock permeability with a true tri-axial stress coal permeametre developed at UQ
- Experimental technologies of super critical CO₂ adsorption on coals at high pressure
- Modeling and numerical methods for simulation of CO₂-enhanced

CBM process

✓ **Report to GA on the visit**

Main activities in Australia

(1) Academic exchange with Dr. Geoff. Wang on ECBM and CCS in Iron & Steel industries in China

- A joint paper on ECBM is being prepared.
- A joint project proposal on ECBM has been submitted
- Joint paper and possible project on CCS in Iron & Steel industries in China are discussed for further collaboration.

(2) Academic exchange on CBM/ECBM with Energy & Environment research group at UQ (Two seminars)

- Dr. Fang gave a presentation about “IRSM's activities toward CCS in China”.
- Dr. Paul Massarotto, Dr. Fuyang Wang, Dr. Grant Dawson and
- Dr. Jinfang Gao gave presentations respectively.

(3) Visiting the true tri-axial stress coal permeameter lab at UQ

- Learned the measurement techniques of coal/rock permeability with a true tri-axial stress coal permeameter developed at UQ.

(4) Visiting and academic exchange in the Earth System Science Computational Centre (ESSCC) at UQ

- Dr. Fang introduced the IRSM CCS group to ESSCC
- Dr. Huilin Xing (Deputy Director) introduced the Parallel

adaptive Nonlinear Deformation Analysis Software (PANDAS)

- Dr. Xing and Dr. Fang discussed the potential cooperation of joint development of PANDAS for CCS simulation

Achievements during the visit

- Identifying the advantages and disadvantages of UQ's experimental apparatus and comparing them with experimental apparatus developed in IRSM
- Developing possible joint project for further collaboration
- A joint paper has been prepared.

Benefit to me or our organization from my visit

Through this visit, the relationship between the University of Queensland and IRSM has been enhanced. We know what they can do and what research cooperation we can do in the future.

My future plan in relation to the area of CCS

My job related to CCS is ECBM, and UQ is very strong in this area with solid research foundation and a very good research team. Therefore, I will seek opportunities to further cooperation with UQ.

✓ Acknowledgments

The visiting program is funded by the China Australia Geological Storage of CO₂ (CAGS) Project, which is funded by the Australian Government. I sincerely thank GA for giving me the opportunity to visit Australia. With my sincerely thank to Dr. Geoff. Wang and other staffs of UQ for

providing me good arrangements of my visit and taking care me when I was in Australia. At last, I want to thank Ms. Jessica and other staffs of GA, for the warm reception in Canberra.