

## COMPUTATIONAL MODELLING OF COUPLED CHEMO-MECHANICAL PROCESSES IN GEOENERGY APPLICATIONS

300 (MULTISCALE AND MULTIPHYSICS SYSTEMS)

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### ABSTRACT

Prediction of the behaviour and responses of geo-materials in various natural and engineered system requires computational analysis of highly coupled physico-chemical and mechanical processes. This mini-symposium will be dedicated to the advances in the field of computational modelling of coupled behaviour of geo-materials with a focus on chemically and bio-geochemically coupled phenomena involved in the flow and mechanical behaviour of soil and rock.

Considerations will be given, albeit not limited, to the soil and rock behaviour in geo-energy and geo-environmental applications. The aim is to facilitate the exchange of advanced practices and knowledge between the researchers on theoretical, experimental and computational aspects of geo-mechanics. A non-exhaustive list of relevant subjects and example areas of engineering applications includes:

- Geological disposal of high level nuclear waste
- Geological sequestration of carbon dioxide
- Geothermal energy systems
- Unconventional subsurface energy and reservoirs
- Physical and chemical rock stimulation processes
- Bio-mediated and bio-inspired ground improvement techniques

- Reactive transport in fractured rock.

Advances in theoretical formulations, numerical solutions and computational approaches in multi-scale predictions will be addressed, presented and discussed. Of high interest to this mini-symposium are research studies of microscopic, mesoscopic and macroscopic phenomena and integration of computational and experimental geomechanics.

*We anticipate that the mini-symposium will receive strong interests from researchers in multiple declines. The main organiser (Majid Sedighi) has jointly organised a mini-symposium on “Materials in demanding environments” at the 12<sup>th</sup> WCCM in 2016 in Korea which was successfully held in two sessions. A number of selected abstracts from the previous mini symposium were then published in a Special Issue in the International Journal of Mechanical Sciences [1]. We plan to organise a special issue on the mini symposium proposed in a high quality journal for selected abstracts (e.g. International Journal of Mechanical Sciences and subject to the final approval of the Editor). We also anticipate that there will be two keynote speakers on the topic of “multiscale modelling of coupled chemo-mechanics”.*

#### **REFERENCES**

- [1] A.P. Jivkov and M. Sedighi, “Special issue on materials in demanding environments”, International Journal of Mechanical Sciences, Vol 144, pp 813, (2018).