Thomas Le Blevec

Geostatistical facies modelling in carbonate reservoirs

Abstract: Facies modelling is an important step when modelling petrophysical properties in a reservoir.

It is important to develop geostatistical methods to quantify spatial relations between facies using available data. It is also important to develop the geostatistical simulation methods that can use these relationships as modelling constraints. Carbonate reservoirs tend to be composed of asymmetrical facies sequences. This is mainly caused by relative change in sea level, inducing the stacking of shallowing upward facies sequences. Consequently, the facies relations upwards are different from those downwards which cannot be taken into account by standard geostatistical tools such as the variogram. Moreover, the most advanced modelling methods such as TGS (Truncated Gaussian Simulation) or PGS (Pluri-gaussian Simulations) cannot model asymmetries in their standard form.

In this presentation, we will discuss an interesting geostatistical tool to quantify asymmetries, which is the transiogram. Then, we will see how to modify the PGS modelling method in order to constrain it to asymmetrical transiograms. Finally, we will present our asymmetrical assessment and modelling results for a vertical section from the Triassic Latemar platform in the Dolomites, Northern Italy.

Bio: Undergrad in Paris, in general science and engineering preparation classes. Then, I got the french engineering diploma in earth science and engineering at the Ecole Nationale Superieure de Geologie. At the same time, I also did a master specialised in geomodeling and geostatistics at Universite de Lorraine.

Wenzhuo Cao

Mechanism and Mitigation of Gas Outburst and Rockburst Hazards in Coal Mines

Abstract: With ever increasing stress and gas emission environments, hazards such as gas outbursts and rockbursts become potential causes for production stoppages, equipment damage or even loss of lives. In light of the actual stress conditions of deep underground excavations, this research will first analyse the dynamic fracture process of coal through experimental investigations as well as numerical simulations. Secondly, a triggering criterion for unstable rock failure will be proposed by comprehensive consideration of in situ stress, gas pressure gradient and dynamic disturbance. In addition, hydraulic fracturing and slot cutting shall be considered to mitigate these hazards, with the performance evaluated by both in situ measurement and numerical analysis. The ultimate goal of this research is to provide a hypothesis that can explain the dynamic process involved in gas outbursts
and rockbursts, and mitigate these hazards in mining practices. The findings of this research will contribute to the safe and economical underground excavation or mining of coal in burst-prone zones.

**Biography:** Wenzhuo Cao is a first-year PhD student at Imperial College. His research interests include rock failure and fracture, dynamical properties of rock materials, and numerical simulations as predictive tools for underground mining and tunneling.

**Asiri Obeysekara**

**Numerical Modelling of Hydraulic Fracturing in Naturally Fractured Rock using a FEM-FEMDEM Coupled Approach**

**Abstract:** The project hopes to improve current understanding of fractures and fluid flow through improvements in the numerical modelling of hydraulic fracturing: specifically the coupling formulation, enhanced fracturing realism in 2D and 3D, extension of the models to include poroelasticity of rock and fluid-leak off effects. It is envisaged that enhanced modelling capabilities as well as the increased understanding of hydraulically induced fracture initiation and propagation will provide the knowledge and tools needed to tackle new and complex geomechanical problems in reservoir modelling, and tackle the environmental impact in the oil and gas sector.

**Bio:** Graduated from University of Southampton in 2011 with a Masters in Physics. Started a PhD project at AMCG funded with the Centre for Doctoral Training (CDT) in Oil and Gas in 2014 with JP Latham, J Xiang and C Pain working on solid-fluid coupling methods and techniques, with specific applications for the oil and gas sector.