CoalSIM (Coal Simulation Technologies)

Multiscale Transport In Porous Systems

COALSIM SPECIALISTS

◆ Coal Seam Gas (Coalbed Methane) developments

◆ Calculation of petrophysical properties of rocks

◆ Using statistical methods for constructing a reservoir model based on limited cores

◆ Simulation of Coal Seam Gas reservoirs and prediction of gas recovery

◆ Micro-CT imaging of coal cores for accurate prediction of permeability and relative permeability

◆ History matching of coal seam gas reservoirs

◆ Optimising methane production

◆ Reducing water production from coal seam reservoirs

◆ Improving safety of coal mining

◆ Designing gas drainage systems from coal mines

OUR EXPERTS

Dr Peyman Mostaghimi (Lecturer, Petroleum Engineering, UNSW) - Expert on numerical simulations and computational methods related to fluid flow through porous media. His previous experience includes work at Imperial College, London, where he worked on industry projects with Rio Tinto and consortium of oil companies. Email: peyman@unsw.edu.au

Dr Ryan Armstrong (Lecturer, Petroleum Engineering, UNSW) - Expert on X-ray computed microtomography and processing of digital rock image. His previous experience includes work for Shell Global Solutions International where he developed 'Digital Rock' technology.

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THE TOOLS OF OUR TRADE

Our technology is based on X-ray computed tomography to image the internal structure of coal in 3D. The images provide direct relationships between physical coal properties and the underlying structure. Images are combined with advanced numerical simulations to provide an efficient means to estimate flow of methane gas through coal. The method estimates coal permeability from coal lump samples and/or core samples collected from the mine sites and/or coal seam reservoirs. Using our statistical methods, the measurements are integrated and 'up-scaled' to predict the performance of entire coal seams. As a result, we analyse the performance of coal seam gas reservoirs and predict gas/water production. We also provide practical suggestions for improving gas production and reducing water production. Our methods are also used for improving safety of coal mining operation by providing design guidance for gas drainage systems.

SELECTED RECENT PROJECTS

3D imaging of coal samples for Queensland Gas Company (QGC Australia, now joined Shell)
  -Porosity, coal typing, absolute permeability, and relative permeability
Prediction of gas adsorption and desorption in coal seam gas reservoirs (QGC Australia)
    -Deformation, diffusion, and cleat statistics
Petrophysical analysis of coal in collaboration with NSW government