Reservoir Engineering Aspects of Coalbed Methane: Fundamentals and Application. Reserves Estimations

K. Morad (Fekete Associates Inc.)

SUMMARY

The fundamentals of Coalbed Methane are presented. Coalbed methane and conventional sand reservoirs are compared to illustrate their similarities and differences. Using numerous illustrations, fundamental concepts such as the structure of coal and the storage mechanisms, and how adsorption plays an important role are explained.

The different transport mechanisms from desorption through diffusion to Darcy flow are explained. The effects of compaction and matrix shrinkage on the absolute permeability and the effect of changing water saturations on the relative permeability to gas and water are demonstrated. The uses of these fundamentals in reservoir engineering applications are also discussed.

The Volumetric method and the complexities associated with it, the application of Material Balance in CBM and how the traditional p/z concept, with modifications, is extended to CBM and the limitations in using material balance for CBM are explained. The Deliverability Forecast, the use of IPR equations and the key factors that affect the Deliverability Forecast of a CBM well are also discussed.

The changes in gas composition during a multi-component CBM production, the necessity of predicting these changes and how binary Langmuir isotherm can be used to that end are explained.

Risk analysis using Monte Carlo simulation, circumstances under which risk analysis becomes a valuable tool and examples of its application are discussed.