

CERAMAH TEKNIK TECHNICAL TALK

“SIZE & SCALE MATTERS”: NEW PETROPHYSICAL METHODS TO EVALUATE STORAGE AND FLOW CAPACITY OF CONVENTIONAL & UNCONVENTIONAL RESERVOIRS FROM DIGITAL CORE ANALYSIS (DCA) AND PORE NETWORK MODELING (PNM)

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On Thursday, 8 December 2011, Dr. Lutz Riepe, the Principal Petrophysicist in Petronas Carigali, gave a presentation in the University of Malaya Geology Department main lecture hall entitled “Size & Scale Matter: New Petrophysical Methods to Evaluate Storage and Flow Capacity of Conventional & Unconventional Reservoirs from Digital Core Analysis (DCA) and Pore Network Modeling (PHM)”. Dr. Riepe highlighted the use of important new, emerging technologies for reservoir characterisation, such as Micro-CT based computed tomography to produce true 3D images of pore fabrics, based on results of collaborative efforts between Petronas and Australian National University. Applications and case histories, concerning Malaysian conventional reservoirs, as well as unconventional reservoirs (tight carbonates and fractured basement) from Petronas’ international assets, were presented. The lecture was attended by about 35 faculty, students, and industry personnel.

Abstract: Since the discovery of the mysterious “X-Rays” in 1885 by the German physicist Prof. Wilhelm Conrad Roentgen (for which he received the very first Nobel prize in Physics in 1901), the X-Ray technology has been intensively used in medicine and material sciences to investigate density variations at different scales in 2D and 3D (Computer Tomography, CT).

These medical CT scanners were used in core analysis laboratories for qualitative investigations of full cores and core plugs for the selection of homogeneous suitable samples, e.g. for SCAL, but due to the limited resolution could not be used for any quantitative petrophysical analysis.

In petrophysics the application of X-ray CT technology for the characterization of porosity and permeability started only about 5-10 years ago when new “Micro-CT (MCT)” hardware and computer power was available to generate and evaluate 3D images of the true pore fabrics down to a resolution of 1 μm .

Since 2009 PETRONAS has participated in JIPs with ANU (Australian National University) in the “Digital Core Consortium” and has successfully tested the application of Digital Core Analysis (DCA) and Pore Network Modeling (PNM) technology for clastic rocks from our domestic operations (“LRLC” rock samples from Kumang & Sepat), and some “unconventional” reservoirs in our international assets (“Tight gas” Oman, “Fractured Basement” and “Tight Carbonates” Vietnam). The ongoing DCA/PNM research is now focusing on the characterization and rock typing of carbonates and the quantitative analysis of petrophysical and mineralogical parameters from rock fragments and cuttings, that are not suitable for conventional lab analysis.