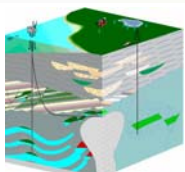


Magnetic Resonance Measurements for Mud Logging (MR-ML™)



KMS Technologies, KJT Enterprises, Inc.

KMS Technologies – KJT Enterprises Inc. and their alliance partner NMR Plus Inc. of Canada have developed new technology to evaluate rock and fluid properties in real time while drilling. The product is a mobile NMR relaxometer designed for NMR mud logging, water-cut, and on-site core analysis. The approach is based on Low Field NMR (Nuclear Magnetic Resonance) measurements and is intended for faster and more reliable identifying of hydrocarbon-bearing reservoirs while drilling a well (mud logging). Drill cuttings and micro-samples of hydrocarbons delivered to the surface are used to make the measurements. The new NMR application provides better results when used in conjunction with conventional techniques.



KMS Technologies

KJT Enterprises Inc.
6420 Richmond Ave., Suite 610
Houston, TX, 77057
USA

Tel.: +1.713.532.8144
Fax: +1.713.532.7776

Email: gang@kmstechnologies.com or
info@kmstechnologies.com
<http://www.kmstechnologies.com>

Benefits:

- Formation evaluation and petrophysical parameters during mud logging
- Real time pore pressure prediction densities
- NMR log calibration parameters
- Low cost NMR log substitution
- Competitively priced NMR devices and software

Hardware:

The core of the technology is the new generation of portable magnetic resonance spectrometers (~25 kg) combining basic specifications of laboratory low-field relaxometers with unique features, making the MR-ML™ instrument adaptable to a variety of on-site measurements. The size of the sensitivity region is tailored to accommodate drill cuttings or core samples (approximately 4 cm by 5 cm). The system is designed to maximize "SNR/WEIGHT" ratio, and the NMR experiment parameters are automatically adjusted during calibration procedure, thus the measurement are automatically corrected for any instabilities and environmental changes.

Software:

- User friendly Windows-based interface
- Advanced inversion methodology for T_2 distribution
- Porosity, permeability, S_{wirr} on-site or in a laboratory
- One-button software for major applications (mud logging)
- Calibration and tune functions
- Full spectrometer acquisition software for 'expert' NMR applications
- NMR simulator, Bi-modal mode, multiple measurement set-up and execution (optional)

| Specification Sheet | MR-ML™ Instrument |
|---|-------------------------------|
| Minimum Time to First Sampling Points on NMR Relaxation Curve, ms | 0.16 |
| Maximum Number of Sampling Points on NMR Relaxation Curve | 5000 |
| Maximum Duty Cycle of RF Transmitter | 10 % |
| Wait Time, ms | 50-40000 |
| NMR Frequency (MHz) | 1.5-2 |
| Maximum Sample Size, inches | 1.5 |
| S/N, Full Size Water Sample | > 200 |
| Maximum Warm-Up Time, min | < 20 |
| Line Input Power | 120 V, 6 A |
| Operating System | Windows 98, NT, XP |
| Communications | Parallel Port |
| Dimensions (can be mounted in 19" cabinets/racks), inches | Width-19, Height/Depth - 10.5 |
| Weight, lb | 50 |

We benchmarked the instruments many times to verify estimating errors. The error of estimating the total NMR signal amplitude A_s depends on the properties of the rock under study and of accepted measurement modes. The relative error of A_s routine measurements (δ) is less than $\pm 1.5\%$.

Figure 1 and 2 display accuracy of the total porosity and permeability measurements.

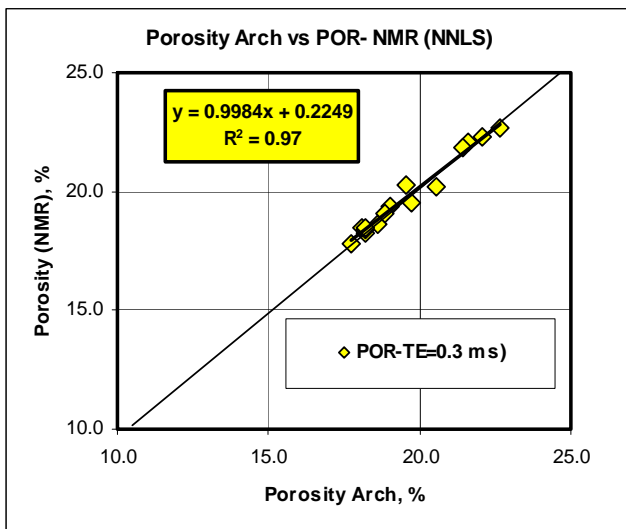


Figure 1: Archie Porosity versus Porosity NMR.

The figures compare porosity and permeability values obtained by NMR

measurements with those resulting from conventional laboratory techniques.

Fully water-saturated rock cuttings provide the most preferable conditions for evaluating permeability from NMR measurements. The figures demonstrate high coefficients of correlation MNR measurements with a conventional method of porosity and permeability estimations.

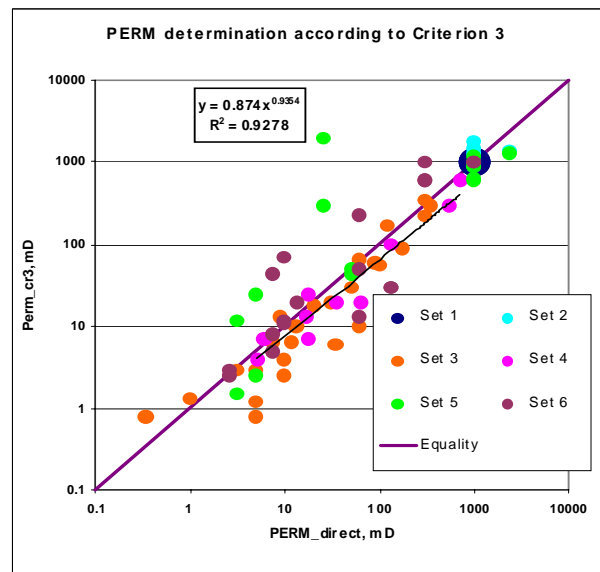


Figure 2: Permeability conventional versus Permeability NMR.