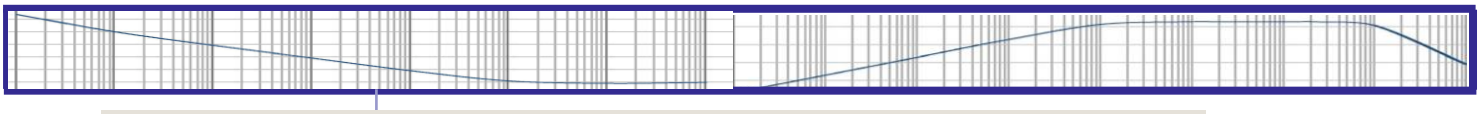
KMS Technologies
Innovating Solutions

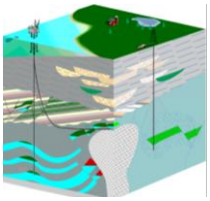
Wireline/LWD 3D EM modeling

1D-2D-3D modeling & inversion services



Services description & applications

During the past decade numerous new electrical logging technologies and tools have been developed. Electrical logging offers one of the most effective and economical ways to distinguish between hydrocarbon and water, and resistivity is one of the key parameters used in reserves calculation. KMS Technologies provides a variety of electromagnetics (EM) 1D, 2D, 3D modeling & inversion software and services including applications for borehole environments. All codes were developed in-house by 3DEM Holding LLC and were merged with KMS Technologies.



ELECTRICAL / DIELECTRIC LOGGING TOOLS

LWD tools ARC, MCR, GVR, EcoScope, AWR, CWR, MPR, NaviGator, DPR, ASR, HPR, SPR, MFT, GuideWave, Sci-Quest PRT, WPR, GRT, Centerfire, ASR, EWR, AFR, Deep Trak, AziTrak, PeriScope, ADR, etc.
Generic resistivity LWD in frequency- and time domain.

Wireline tools AIT, RtScanner, 3DEX, other induction, galvanic (DC), dielectric and through-casing tools and imagers.

1D-3D EM MODELING SOFTWARE

MAXANIS™ General 3D finite-difference (FD) modeling software, arbitrary 3D anisotropy.
Resistivity LWD and induction measurements;
Dielectric effect; effects of steel casing.

3DEMcyl General 3D FD modeling software in cylindrical coordinates, transversely-isotropic (TI) anisotropy.
Resistivity LWD and induction measurements;
Dielectric effect; effects of steel casing; effect of finite-size coils.

2DEMcyl General 2D FD modeling software in cylindrical coordinates, TI anisotropy.
Resistivity LWD and induction measurements.
Effect of finite-size coils.

MAXAN1D Fast 1D modeling of resistivity LWD and induction measurements. Arbitrary biaxial anisotropy (fractured formation).

1D-3D INVERSION SERVICES

Resistivity
Resistivity anisotropy
Formation dip & azimuth
Distance to bed boundary
Borehole correction
Invasion zone parameters

Fast parallel versions of the software are available to run on KMS' cluster; copies are available for licensing.

The 3D modeling family MAXANIS™ has been used by several industrial users including BHI, Shell, Weatherford, EMGS & Schlumberger. Fast and reliable, MAXANIS™ handles hydrocarbon reservoirs with arbitrary 3D anisotropic media.

Additional products:

3D interpretation services

KMS Technologies

KJT Enterprises Inc.
11999 Katy Freeway, Suite 200,
Houston, Texas 77079 USA

Tel: +1.713.532.8144

Email: info@KMSTechnologies.com
www.KMSTechnologies.com

Product specification

Data input:

- User-friendly tool modeling interface independent of the formation modeling interface
- Will be adapted to customer requirements
- Efficient treatment of arbitrary dipping anisotropy
- Complex structural interfaces

Standard outputs:

- 3D model with visualizer
- Models & curves as per customer requirements

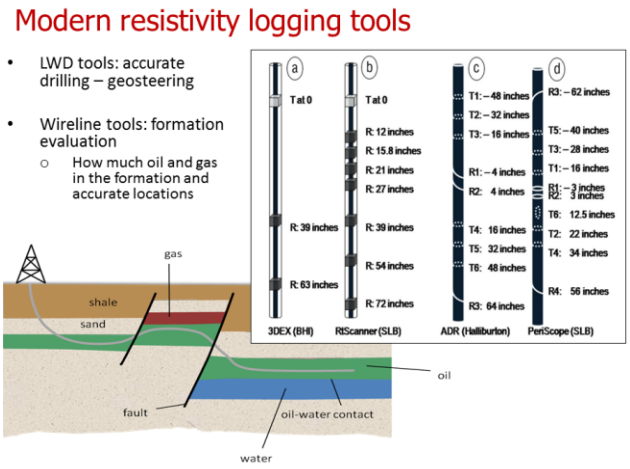


Figure 1: New-generation triaxial induction (a, b) and resistivity LWD tool models (c, d).

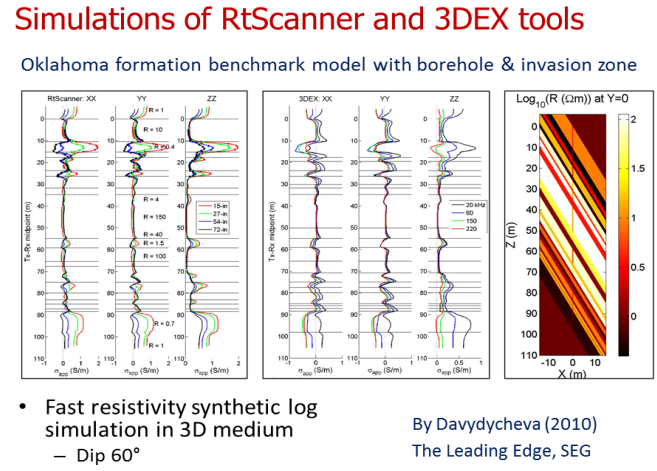


Figure 2: Two triaxial induction tools: synthetic logs through 3D Oklahoma formation.

Benchmarks*

1. **Conventional induction well-logging**: see Anderson et al. (1999).
2. **Triaxial induction logging**: see Davydycheva et al. (2003), Rosthal et al. (2003); Barber et al. (2004); Abubakar et al. (2006), Wang et al. (2006), Wang et al. (2008), Davydycheva et al. (2009), Davydycheva (2010a; 2010b), Davydycheva (2011a; 2011b), Davydycheva et al. (2014).
3. **Resistivity logging-while-drilling**: see Anderson et al. (1997), Davydycheva (2010a; 2010b), Pour et al. (2011), Davydycheva (2011a; 2011b).
4. **Full 3D inversion of triaxial induction logging data**: see Abubakar et al. (2006), Wang et al. (2008), Davydycheva and Kaminsky (2016).
5. MAXANIS family codes have been used by Baker Hughes, Schlumberger and Weatherford for logging tool design.

* Full references & papers can be found in the bottom of http://www.kmstechnologies.com/KMS_flyer_archive.html#Publication