

3D modeling family MAXANIS

Software products & services



Product Description

KMS Technologies provides a variety of electromagnetics modeling software including applications for CSEM (land and marine), surface, surface-to-borehole, and borehole environments. All codes were developed in-house by 3DEM Holding LLC and were merged with KMS Technologies.

The 3D modeling software family MAXANIS™ has been used by several industrial users including BHI, Shell, Weatherford, EMGS & Schlumberger.

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

Fast and reliable, MAXANIS™ handles hydrocarbon reservoirs with arbitrary anisotropic resistive media and complex structural interfaces. This provides a crucial contribution to the success of EM technologies in addressing the needs of the exploration & production industry.

MAXANIS™ core technology is based on proprietary 3D EM finite-difference (FD) modeling software that has been rigorously tested, validated and benchmark tested. The software can be applied for most 3D electromagnetic problems whether located in borehole, land, or marine environments. It incorporates complex terrains, seafloor bathymetry, subsurface geology, arbitrary 3D anisotropic resistive media and much more. This best-in-class software is proven to be more robust at much faster execution times than comparable products.

All MAXANIS™ family software modules and applications are available for licensing (unless marked), including technical support & training:

MARINE & LAND 3D EM MODELING SOFTWARE

MAXANIS™ General 3D FD EM modeling software, arbitrary 3D anisotropy.
Applications: CSEM in **frequency-** and **time-domain**
Surface-to-borehole EM: **effect of steel casing** can be included
FSEM (Focused-Source EM) in frequency- and time-domain
Magnetotellurics (MT)
Ground-Penetrating Radar (GPR)

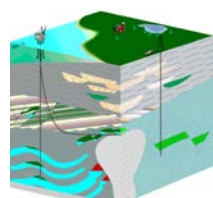
BOREHOLE 1D-2D-3D EM MODELING SOFTWARE

MAXANIS™ General 3D FD modeling software, arbitrary 3D anisotropy.
Applications: Resistivity LWD and induction measurements
General time-domain measurements
Galvanic tools (DC)
Cross-well & Surface-to-borehole measurements (restricted)

3DEMcyl 3D modeling software in cylindrical coordinates.
General resistivity LWD and induction measurements.
Effect of finite-size coils can be included.

2DEMcyl 2D modeling software in cylindrical coordinates.
General resistivity LWD and induction measurements.
Effect of finite-size coils can be included.

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



Additional 3D products:

3D interpretation services
Land EM survey feasibility

KMS Technologies

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Product specification & applications

Data input:

- Will be adapted to customer requirements
- Efficient treatment of air-Earth or air-water interface: topography or bathymetry available

Standard outputs:

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

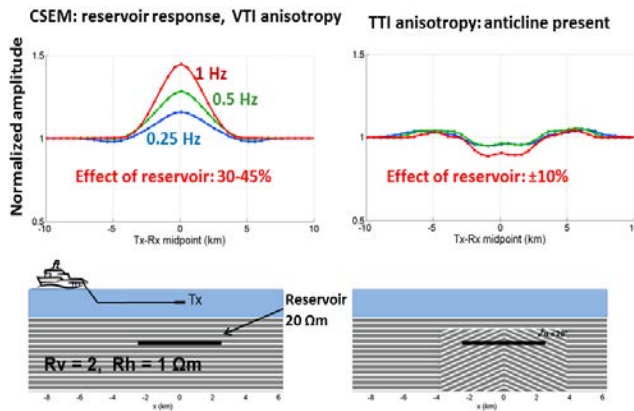
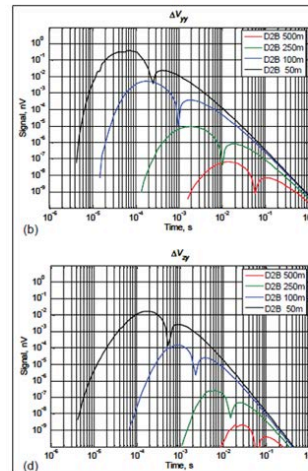


Figure 1: Frequency-domain CSEM application with synthetic 3D reservoir and arbitrary TTI (tilted transversely isotropic) versus VTI (vertical TI) anisotropy. The reservoir anomaly is significantly affected by the anticline.

Consol Results



MAXANIS Results

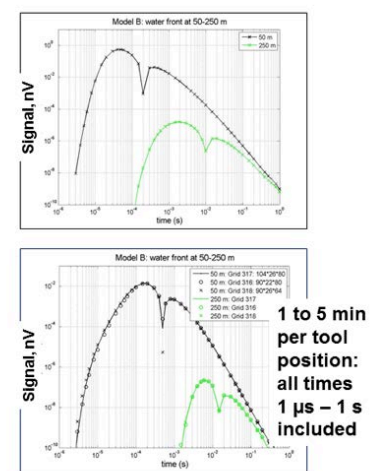


Figure 2: Time-domain reservoir monitoring: modeling comparison versus Consol results, on the left, published by Dutta et al. (Petrophysics, 2012, no. 3, 222-232); MAXANIS™ results: on the right.

Benchmarks*

1. **Time-domain land/marine EM survey:** see Davydycheva et al. (2006), Davydycheva and Rykhlini (2009; 2011), Davydycheva et al. (2015).
2. **Frequency domain Controlled-Source EM and magnetotelluric surveys:** see Davydycheva and Rykhlini (2009; 2011), Frenkel and Davydycheva (2009), Zaslavsky et al. (2011), Frenkel and Davydycheva (2012), Davydycheva and Frenkel (2013).
3. **Ground-penetrating radars and near-surface EM application for detection of clandestine tunnels:** see Frenkel and Davydycheva (2010).
4. **Conventional induction well-logging:** see Anderson et al. (1999).
5. **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), Pour et al. (2011), Davydycheva et al. (2014).
6. **Full 3D inversion of triaxial induction logging data:** see Abubakar et al. (2006), Wang et al. (2008), Davydycheva and Kaminsky (2016).
7. **Resistivity logging-while-drilling:** see Anderson et al. (1997), Davydycheva (2010a; 2010b), Davydycheva (2011a; 2011b).
8. **Cross-well and surface-to-borehole EM:** see Zaslavsky et al. (2011), Strack et al. (2016), Davydycheva et al. (2017).
9. MAXANIS and 3DEMcyl have been used by Baker Hughes, Schlumberger and Weatherford for logging tool design.

*Full references & papers can be found on KMS technologies.com – Info Archive – Tech. literature (in the bottom)