

Ceramah Teknik (Technical Talk)

Specialised geophysics for oil and gas industry

DEVA GHOSH

Laporan (Report)

Dr. Deva Ghosh, Custodian of Geophysics, Petronas-Carigali Sdn. Bhd., gave a well-illustrated and very informative talk to about 50 participants, mainly students, on 9 January 2004 at 5.30 pm at the Geology Department, University of Malaya. It was good to see many students coming forward with good questions during discussion time.

Abstrak (Abstract)

Specialised Geophysics is the wing of Geophysical methods where the seismic measurements are used to derive quantitative information about the subsurface in terms of:

- a) Velocity-depth structure
- b) Reflectivity and impedance profile
- c) Reservoir properties d) Fluid and lithology

All these fall under the broad terminology called Seismic Inversion.



Given a Geological model with defined boundaries, structure and petrophysical identifiers one can compute its Seismic response either simulating it in the computer what is known as Forward modelling or actually going in the field (land or offshore) and sending acoustic waves and recording the Seismic response or the echo from the subsurface. This response is then interpreted Inverted to yield the subsurface architecture and properties.

The seismic data can be inverted in a variety of ways giving rise to the following methods i.e.

Seismic Imaging	Velocity/Structure
Seismic AVO:	Lithology and Fluid Content
Seismic Inversion:	Imedance and Fluid
Time-Lapse:	Fluid and reservoir Monitoring

Seismic Inversion in terms of reservoir and fluid properties is basically a non unique or in other words there can be a large number of possible solution, hence we have to invoke external controls called 'constraints'. These constraints are bounds that the solution has to honour. The inversion deals with the following parameters: Data Space, Model Space and Solution space and available Technology. The model constantly updated iteratively such that it can explain the data that was collected.

Development in the field of Geophysics, computing and graphics has helped us to attain our goals. 3D Seismic coupled with 3D Visualisation capability and attribute analysis has played a significant role. Also utilising the knowledge and behavior of Shear waves has led to Better Imaging under Gas wipeouts, Understanding fractures and better Seismic illumination below salt domes and on the flanks. These are incorporated in the new acquisition technique coined as OBC where the cable is laid on the ocean bed as opposed to dragging the streamer behind the boat in conventional methods in Marine seismics.

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