**Ain Shams University**

**Faculty of Science**

**Geophysics Department**

# Multi-Dimensional Seismic Attributes and Density Models of the Hydrocarbon Plays Inferred from Seismic Reflection and Bouguer Gravity Data at the Northern Region of West El-Qantara in Nile Delta Basin, Northern Egypt

A Thesis submitted for Partial Fulfillment of the Requirements for the Master Degree of Science in Geophysics

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# Note

The present thesis is submitted to Faculty of Science, Ain Shams University in partial fulfillment for the requirements of the Master degree of Science in Geophysics.

Beside the research work materialized in this thesis, the candidate has attended ten post-graduate courses for one year in the following topics:

1- Geophysical field measurements.

2- Numerical analysis and computer programming.

3- Elastic wave theory.

4- Seismic data acquisition.

5- Seismic data processing.

6- Seismic data interpretation.

7- Earthquake seismology.

8- Engineering seismology.

9- Deep seismic sounding.

10- Structure of the earth.

He successfully passed the final examinations in these courses.

In fulfillment of the language requirement of the degree, he also passed the final examination of a course in the English language.

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# ABSTRACT

Onshore, the Nile Delta has experienced a rigorous and successful exploration campaign during the last few years. This is because of the importance of the Nile Delta basin economically as a gas bearing basin. Since 2007, Dana Gas Egypt Limited explored many Pliocene and Miocene Gas discoveries in West El Qantara concession located in the eastern Nile Delta. The present study is in West El-Qantara concession and is located in the eastern on-shore part of the Nile Delta, south of El Manzala Lake. The study area lies between Latitudes 31° 02' 00" & 31 ° 08' 00" N and Longitudes 31° 46' 00" & 32° 02' 00" E.

Gravity method is commonly integrated with seismic for the deep seated structures imaging for the purpose of understanding the pre-existing structures and how they develop with time. This has a great impact in tracking the migration of hydrocarbon fluids and their entrapments. The 2D density (crustal) models were constructed and they illustrated the distribution of the basement and the shallow sedimentary cover which is containing the petroleum system elements (source rocks, seal rocks, and cap rocks) in relation to a specific structural trap.

3D seismic together with wells data have been used to interpret different sequence boundaries in Pliocene and generate synthetic for deeper interpretation tie-in. The Pliocene section divided mainly into three major sections, the upper part is clinoform dominated with slump channel, while the middle and lower part dominated with slope channel clearly identified using the Coherency slice.

***Keywords:*** *Bouguer gravity, Residual gravity, regional gravity, 3D Seismic Interpretation, 3D Seismic Attributes, Variance, West El Qantara, Egypt*

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