DEVELOPMENT OF APPLICATION MAPS FOR PVT PROPERTIES CORRELATIONS AS GUIDELINES FOR CORRELATIONS SELECTION

By

Ahmed Mohamed El-Sayed Selim

A Thesis Submitted to the
Faculty of Engineering at Cairo University
In Partial Fulfillment of the
Requirements for the Degree of
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In
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Title of Thesis:

"Development of Application Maps for PVT Properties Correlations as Guidelines for Correlations Selection"

Key Words:

PVT – Black Oil Correlations – Correlations Selection – PVT Expert System – Application Maps

Summary:

Reservoir fluid properties (PVT properties) form the basis of many petroleum engineering calculations. The preferred way to determine the PVT data is by laboratory experiments on reservoir fluid representative samples. However, it is sometimes hard to obtain such samples and the engineer is left to estimate PVT properties from empirical correlations. The main target of the present research is to build Application Maps system that use groups of correlations to calculate input data that are used to evaluate correlations. Hence, application maps evaluate groups of correlations with complicated errors instead of single correlations with simple errors. The overall error that is resulted from using the Application Maps is 16.75%.

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DEDICATION

I would like to dedicate this thesis to my mother, my wife and my sister.

Only with your support and your true love and encouragement, I finished this work. Beside you, I can pass and do anything in this life.

Table of Contents

LIST OF TABLES

LIST OF FIGURES

NOMENCLATURE

B_o = Oil Formation Volume Factor
B_g = Gas Formation Volume Factor
bbl = Barrel
cm = Centimeter
cp = Centipoise
C_o = Isothermal Compressibility of Oil
Eq. = Equation
Fig. = Figure
FT = Feet
°F = Degree Fahrenheit
G_{Sp} = Gas Specific Gravity
in = Inch
M = Thousand
No. = Number
P = Pressure
P_b = Bubble-Point Pressure
Psi = Pound per Square Inch
Psia = Pound per Square Inch Absolute
Psig = Pound per Square Inch Gauge
°R = Degree Rankine
R_s = Gas in Solution
T_r = Reservoir Temperature
V = Volume
γ = Specific Gravity
γ_g = Gas Specific Gravity
γ_o = Oil Specific Gravity
μ = Viscosity
μ_g = Gas Viscosity
μ_L = Liquid Viscosity
ρ = Density
ρ_g = Gas Density
ρ_L = Liquid Density
% = Percentage
° = Degree

Abbreviations

AAE = Absolute Average Error
API = Oil Gravity in °API
Avg. = Average
BHT = Bottom Hole Temperature
BHP = Bottom Hole Pressure
GLR = Gas Liquid Ratio
GOR = Gas-Oil Ratio