

CHAPTER I

INTRODUCTION

Wireline formation test (WFT) becomes more promisingly important in hydrocarbon exploration and appraisal. Due to high cost, safety, and environmental impact of performing well testing, WFT is now an alternative method. It can provide the valuable and cost-effective information from reservoir such as formation pressure, fluid gradient, formation fluid samples, fluid contact, and an estimation of near wellbore permeability. Thus, for some particular purposes, WFT can probably be sufficient to obtain the required reservoir parameters within the understanding of the wireline formation test interpretation and their limitation.

1.1 Objective

This paper studies and evaluates the most effective scenario for obtaining reservoir parameters from wireline formation test conducted in multilayer reservoirs. It aims to study the scenario in which certain reservoir parameters can be estimated by using wireline formation test as the alternative method to a conventional well test. There is an overlap between WFT and well test from which certain reservoir parameters can be obtained from WFT instead of performing conventional well test to acquire cost effectiveness, less environmental impact, and more safety. In order to achieve this, pressure transient analysis method is used to estimate the reservoir parameters from wireline formation test data. The permeability is obtained from the interpreted data collected from numerous case studies in multilayer reservoir. In addition, the radius of investigation will be analyzed to check whether the radius of investigation goes beyond the skin zone and what parameters can be obtained within the radius of investigation of the WFT tool and gauge resolution.

1.2 Methodology

To appraise the effective scenario for obtaining permeability or other reservoir parameters from the wireline formation test from multilayer reservoir, these are eight steps to accomplish as follow:

1. Gathering and preparing data for simulation model.
2. Using simulators software to simulate pressure responses for a single well model in a single layer reservoir for a base case to confirm numerical solution with analytical solution.
3. Analyzing pressure responses for base case using a well test interpretation software.
4. Simulating pressure responses for a single well model in multilayer reservoir
5. Analyzing pressure responses for multilayer cases using a well test interpretation software.
6. Estimating permeability from three averaging techniques, geometric arithmetic, and harmonic mean and comparing interpretation results with simulation input.
7. Simulating pressure response and varying permeability, duration test and probe position and comparing interpretation result with simulation input.
8. Comparing results obtained from conventional well test and wireline formation test in multiple layer reservoir system to justify if the results from WFT provide the satisfactory information.

1.3 Thesis Outline

This thesis paper consists of five chapters.

Chapter II reviews previous works and developing on well test and wireline formation test (WFT)

Chapter III introduces the theory and concept related to this study.

Chapter IV presents the study results from simulations and interpretations.

Chapter V provides conclusions of the study and recommendations for the further study based on this study point of view.