# CHAPTER I

# INTRODUCTION

Understanding well performance is important for engineers to evaluate and determine production schematic, operating conditions, and timing of artificial lift for planning purposes. Each of these activities is an integral part of the efficient operation of producing wells and successful reservoir management. When considering the performance of an oil well, it is then useful to present the well production rate as a function of the driving force in the reservoir, that is, the pressure difference between average reservoir pressure and the flowing bottomhole pressure. This type of presentation is known as an "inflow performance relationship" (IPR) curve. The equation that is used to plot the IPR curve can be very complex and depends on many parameters. Typically, it depends on the reservoir pressure, drive mechanism, and rock and fluid properties.

For steady-state flow of a single, incompressible fluid, the IPR can be derived from a straight-line relationship between well flowing pressure and flow rate from Darcy's law. However, when two-phase flow exists in a reservoir, this relationship should not be expected to hold. The IPR relationship of two-phase flow is in fact nonlinear. Many forms of IPR curves have been developed for different reservoir conditions such as (1) Vogel[1], (2) Fetkovich[2], and (3) Jones, Blount and Glaze[3].

However, these IPR can be used to predict the relationship between well flowing pressure and flow rate at current reservoir conditions. Future IPR needs to be determined in order to predict future well performance. Klines and Clark[4] studied and proposed the method to predict future oil well deriverability and inflow performance relationship (IPR) curves. Inflow performance of 21 theoretical solution-gas-drive reservoirs was simulated using Weller[5] method.

The objective of this study is to improve method for prediction of future inflow performance relationship (IPR) by performing detailed reservoir simulation for various reservoir conditions. We will focus on solution-gas drive reservoir with a single vertical well drilled in a rectangular reservoir. The parameters which are concerned in this study are bubble point pressure, drainage area, residual oil saturation, critical gas saturation, permeability, and porosity.