

## Reservoir Properties Effect on Estimating Initial Gas in Place Using Flowing Material Balance Method

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**Abstract :** Accurate estimation of initial gas in place (IGIP) plays an important factor in the decision to develop a gas field. One of the methods that are available in the industry to estimate the IGIP is material balance. This method required that the well has to be shut-in while pressure is measured as it builds to average reservoir pressure. Since gas demand is high and shut-in well surveys are very expensive, flowing gas material balance (FGMB) is sometimes used instead of material balance. This work investigated the effect of reservoir properties (pressure, permeability, and reservoir size) on the estimation of IGIP when using FGMB. A gas reservoir simulator that accounts for friction loss, wellbore storage, and the non-Darcy effect was used to simulate 165 different possible causes (3 pressures, 5 reservoir sizes, and 11 permeabilities). Both tubing pressure and bottom-hole pressure were analyzed using FGMB. The results showed that the FGMB method is very sensitive for tied reservoirs ( $k < 10$ ). Also, it showed which method is best to be used for different reservoir properties. This study can be used as a guideline for the application of the FGMB method.

**Keywords :** flowing material balance, gas reservoir, reserves, gas simulator

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