



A Realistic Model for Estimating Productivity Index of Vertical Well Using Wellhead Data

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Abstract

Productivity index calculation has been an established tool for formulating inflow performance relationship in petroleum production engineering field. The accuracy in its prediction is highly desirable to petroleum industry to predict the well production efficiency and aid in economic analysis of the well. Inability to accurately model and predict flowing bottom-hole pressure in a well may result in erotic value of productivity index of a well.

This paper present an improved model for estimating flowing bottom-hole pressure and analyse its effect on productivity index value of a vertical well without ignoring any pressure resisting terms in the governing thermodynamic equation. Satisfactory pressure differential and productivity index results were obtained at any location in the wellbore, at all time and at both steady and unsteady state period using the newly developed model. Generally the flow phenomenon after shut in requires sufficient time to stabilise or advance to pseudo steady or steady state condition has been demonstrated by this study compared with the existing models that stabilised throughout the flowing period. This study also

proves that inaccuracy in the results of existing models were not only caused by the effect of pressure restriction due to friction as opined by Guo et al but may have due to oversight of all pressure restriction term in the fundamental governing equation of flowing fluid in a vertical wellbore.

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