Integrated Modeling of Fractured Low Permeability Reservoir, Shangonghe Formation, Baolang Oilfield, Northwest China

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Abstract

This paper integrated Flow Zone (FZ), single sandstone sequence, with the study of fracture, and gave a fine characterization and modeling of fractured low permeability reservoir. It pointed out that calculating the porosity and permeability for low permeability reservoir based on FZ and building the 3D discrete fracture network (DFN) distribution model integrated with the static fracture character and the density distribution of high angle fracture (HAF) and low angle fracture (LAF) are efficient methods for fractured low permeability reservoir. This brings forward the use of FZ and considerable sequence stratigraphy controlled modeling method, and brings forward to build fracture surface from point which controlled by the density distribution of HAF and LAF. The result shows the efficiency of a modeling approach for a fractured low permeability reservoir by integrating low permeability characterization and fracture study.

Introduction

It is still a challenge to model fractured low permeability reservoirs, such as characterizing the low permeability matrix, 3D fracture distribution, fracture character, fracture and matrix coupling character. [1-5]

From the onset of development of Baobei Block, Baolong oilfield in 1994, the detailed sand architecture, flow zone and possible reservoir performance were known. Based on reservoir performance from exploitation, the low productivity could not be characterized by flow zone only and hence the need for an integrated characterization and modeling of the low permeability matrix and fracture is very important.

This paper is based on detailed core analysis, characterization of low permeability matrix, and model build up of the low permeability matrix controlled by multi-surface and flow zone, and construction of 3D discrete fracture network (DFN) distribution model integrated with the 2D fracture distribution, predicted by well-log response and structural curvature, and the fracture occurrence.

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