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Study on Percolation Model of Fractured Horizontal Wells in Fractal Tight Oil Reservoirs

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Recent years, tight oil and gas has become a very important and reliable replacement for conventional energy. The porosity in tight reservoir is very small and there is a threshold pressure gradient (TPG) phenomenon and stress sensitivity in it, which make the fluid in tight reservoir hard to move and has a different employment law from the conventional reservoir, so we need a further research. Combined with the characteristics of tight reservoir, Hydraulic fracturing is the key technology for the development of tight reservoir. Traditional flow-ing model for multi-fractured horizontal wells in tight oil reservoirs are mostly based on classical Euclidean geometry. However, the structure of real tight oil reservoirs is highly heterogeneous and of multiscale, and the fractal theory provides a powerful method to describe the disorder, heterogeneity, uncertainty and complexity of the complex and disordered systems.

The fractal reservoir has been studied in the following aspects by making use of the Mathematical physical method, numerical calculation, computer graphics processing technology, software engineering and theoretical knowledge and application technology of the analysis method are based on the research results:

- (1) Fractal geometric theory and method are good approximations to describe the complicity and we can more easily analysis all kinds of the pressure-sensitive deformable double media fractal complex reservoir relatively than others. Based on Warren-Root model, introducing fractal parameter(and) and deformable coefficient(and), this thesis constructed all kinds of seepage flow mathematical models to the pressure-sensitive deformable double media fractal reservoir with the defined production or closest outside boundary when the effects caused by permeability and porosity company with the pressure change ware concerned.
- (2) Based on three linear flow, we established a well-testing model of fractured horizontal well in fractal reservoir, applied Laplace transform and Stehfest numerical inversion, and obtained the formulas of bottom hole pressure under the constant output. On the basis of model validation, this paper divided flow patterns and analyzed the influence of sensitivity parameters on bottom hole pressure
- (3) It is shown that there mainly exists wellbore storage, transition flow, pseudo-linear flow, pseudo-bilinear flow and boundary flow and at the same time fractals dimensions has a great influence on the bottom hole pressure.

References

- [1]Warren J E, Root P J. The Behavior of Naturally Fractured Reservoirs[J]. Society of Petroleum Engineers Journal, 1963, 3(3):245-255.
- [2]Brown M L, Ozkan E, Raghavan R S, et al. Practical Solutions for Pressure-Transient Responses of Fractured Horizontal Wells in Unconventional Shale Reservoirs[J]. Spe Reservoir Evaluation & Engineering, 2011, 14(6):663-676.
- [3]Chang J, Yortsos Y C. Pressure-Transient Analysis of Fractal Reservoirs[J]. Spe Reservoir Evaluation & Engineering, 1990, 5(1):31.
- [4]Acuna J, Ershaghi I, Yortsos Y C. Practical Application of Fractal Pressure Transient Analysis of Naturally Fractured Reservoirs[C]// Spe Technical Conference and Exhibition. 1992.
- [5]Mandelbrot B B, Wheeler J A. The Fractal Geometry of Nature[J]. Journal of the Royal Statistical Society, 1983, 147(4):468 p.

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