Investigation of Reservoir Heterogeneity Using Memory-based Diffusivity Equation For Complex Reservoirs

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The role of pressure on reservoir performance and management has been introduced by conventional diffusivity equation. However, only accurate measure of pressure response can lead to better reservoir management.

Introducing the memory-based diffusivity equation enables to better understanding of pressure response based on rheological characteristics of the formation rock and fluid. This is because of the complexity of rock structures and fluid rheologies which depend on formation history, and types. Ultimately, this history provides the quantitative and qualitative measures of fossil fluids in the reservoir.

The memory-based diffusivity equation has been solved using numerical methods. To account the non-local aspects of the rock and fluid memories, the fractional derivative is used as memory formalism. A heterogeneous reservoir with synthetic porosity and permeability values is used to investigate the effect of reservoir heterogeneity on the pressure distribution using memory-based diffusivity equation

A comprehensive study on different reservoir parameters such as formation porosity and permeability are thoroughly investigated to capture the influence of reservoir heterogeneity on the pressure distribution. Results show that, the memory-based diffusivity equation can be used to model the flowing of fluid through heterogeneous reservoir.

The finding of this research will enhance the understanding of memory concept toward better reservoir management. It will also help to predict the reservoir performance and to improve the quantitative and qualitative measure of the reservoir