

Does permeability affect energy storage performance?

When permeability exceeds the critical value, energy storage performance worsens as permeability increases in the flat aquifer. However, when permeability is below the critical value, the energy storage performance remains almost unchanged. Fig. 4. Variation of energy efficiency and gas recovery ratio across different permeability values in CAESA.

What is the optimal permeability for energy storage?

An optimal permeability of 100 md is identified for achieving the best energy storage performance. With a cyclic rate increase, the performance shows the opposite trends in different permeability regions and the optimum permeability becomes larger.

What is the optimal permeability?

The optimal permeability varies from 100 md to 300 md with the increasing cyclic rate due to the increasing competitive advantage of the deliverability. A large initial air bubble mass with sufficient air pressure support can improve the energy storage performance across all permeability cases.

How is relative permeability determined?

The relative permeabilities can be determined in various ways. If the local water saturation in Eq. (5) is known, the relative permeabilities can be determined using one of the available relative permeability functions, f and g , of the water saturation as shown in Eqs. (8) and (9).

Why are relative permeabilities different from field data?

The reason for this difference can be that the relative permeabilities from the experimental data represent two phase flow in porous matrix rather than in fractured materials as the relative permeabilities from the field data do.

How are relative permeabilities of water and steam calculated?

Relative permeabilities of water and steam were calculated, by applying the Shinohara method, using data from geothermal wells in Iceland. This method does not require that the local water saturation of the two phase mixture is known, but requires production history of mass flow and enthalpy from each well.

The novel evaluation system for CO₂ storage site selection shows that the target reservoir has more storage space, large injection capacity, high safety factor and low storage cost, which is ...

Energy storage plays as a buffer to handle these changes and is one method for dealing with this matter. Fig. 1 shows storage ranges and discharge durations provided by ...

The inherent high saturation flux density of iron, combined with the distributed air-gap, produces a core material with initial permeability of less than 100, and with high-energy storage capabilities.

Most existing natural gas storage in the United States is in depleted natural gas or oil fields that are close to consumption centers. Conversion of a field from production to storage duty takes advantage of ...

This paper investigates the mathematical modeling and curve fitting of experimental measured relative permeability hysteresis data for H₂ and water during drainage, imbibition processes on ...

With the global energy storage market hitting \$33 billion annually and producing nearly 100 gigawatt-hours of electricity [1], understanding permeability (the rate of technology adoption ...

Relative Permeability Modeling for Underground Hydrogen Storage: A Comparative Analysis of Hysteresis Effects Abstract: The transition towards a sustainable and low-carbon future ...

During the operation of compressed air storage energy system, the rapid change of air pressure in a cavern will cause drastic changes in air density and permeability coefficient ...

A new technique for permeability calculation of core samples from unconventional gas reservoirs. Fuel, 2019, 235: 301-305. Al Khalifah, H., Glover, P. W. J., Lorinczi, P. Permeability prediction ...

This review paper provides a critical examination of underground hydrogen storage (UHS) as a viable solution for large-scale energy storage, surpassing 10 GWh ...

Soils are permeable materials because of the existence of interconnected voids that allow the flow of fluids when a difference in energy head exists. A good knowledge of soil permeability is ...

We estimated the potential hydrogen recovery from a hypothetical depleted field in California and evaluated the efficiency of converting the renewable energy to hydrogen and back to power. ...

In many studies, regions of high geothermal gradient were considered, involving high porosity and high permeability with large mass rocks which tend to be heterogenous in nature, however it is ...

A high-temperature aquifer thermal energy storage (HT-ATES) system has the potential to balance the seasonal mismatch of energy supply and energy demand. Reservoir ...

The results obtained are post-processed for further analysis. The simplified flow chart describing the used numerical ... Fig. 15 shows the average temperature in the heat storage medium of ...

Based on the typical geological and fluid characteristics of low-permeability oil reservoirs in the Liaohe

oilfield, the CMG 2020 version software GEM module is used to ...

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