Temperature driven enhanced geothermal well test data interpretation

Publieke samenvatting / Public summary

Aanleiding

In the context of geothermal reservoirs, the assumption of isothermal reservoir behavior is an incorrect assumption. Therefore, the current well test interpretation tools available are not suitable for use for geothermal systems where significant temperature changes occur especially in injectors and at later time periods in producers. Traditionally, pressure data from downhole gauges is used for well test interpretation. Due to a variety of reasons the pressure data extracted from these gauges is usually noisy therefore making the task of interpretation more challenging. The downhole gauges used to record the pressure changes during a well test experiment are calibrated to temperature changes. Thus, not only is the temperature data during a well test recorded but also due to it being the calibration data therefore the temperature data recorded is usually much less noisy and more reliable than the pressure data. Coupling these reasons with the recent developments in analytical formulations which utilize both temperature and pressure data for interpretation of reservoir properties for geothermal systems leads to the motivation of this proposal.

Doelstelling

In this project we will develop a workflow (research code) to use recorded temperature and pressure data for improve well test interpretation. The developed workflow will be applied and benchmarked to well test data obtained from multiple geothermal reservoirs (provided by

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operators ECW and HYRECO) in the Netherlands. In addition, in this project we also investigate the additional value gained by using temperature data for geothermal well testing compared to the current standard pressure transient analysis approach.

Korte omschrijving

In the project we will take the following steps: 1. Evaluation of current literature and selection of the most relevant state-of-the-art analytical formulations for well test data interpretation using both pressure and temperature data. 2. Benchmark existing research code for pressure transient analysis with standard commercially available well test interpretation software for e.g. SAPHIRE from KAPPA engineering. 3. Develop workflow (by extending an existing pressure transient analysis research code) based on selection from step 1. 4. Apply workflow on field data obtained from geothermal operators ECW & HYDRECO. 5. Reporting the findings as well as providing recommendations for future improvements to geothermal well test interpretation. 6. Extending developed research code to allow for basic usability options.

Resultaat

The main deliverable of this project will be a report with recommendations for improvement to the well testing evaluation method. This will be based on the evaluation of state-of-the-art methods for well test interpretation based on pressure and temperature data. A secondary deliverable is the research code (if possible, made available as open source code) that can be further developed in a widely applicable tool for geothermal well testing in a next step (outside the scope of the current proposal).

De data in deze applicatie is afkomstig van de Rijksdienst voor Ondernemend Nederland (RVO) en wordt in samenwerking met de Topsector Energie ontsloten.
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