Well Testing Before CO_2 Injection

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MOTIVATION AND OBJECTIVES

Motivation

- This study can aid oil and gas companies performing short-term well test understand reservoir properties and flow barriers
- To show simple analytical models with adjustments can be used to interpret CO_2 injection tests

Objectives

1. To study well test designs: short-term water injection or CO_2 injection, and brine production
2. To assess the impact of CO_2 plume near wellbore on interpretation results
3. To interpret CO_2 injection well test using brine-replica (Shchipanov et al., 2019)

MAIN FLOW REGIMES

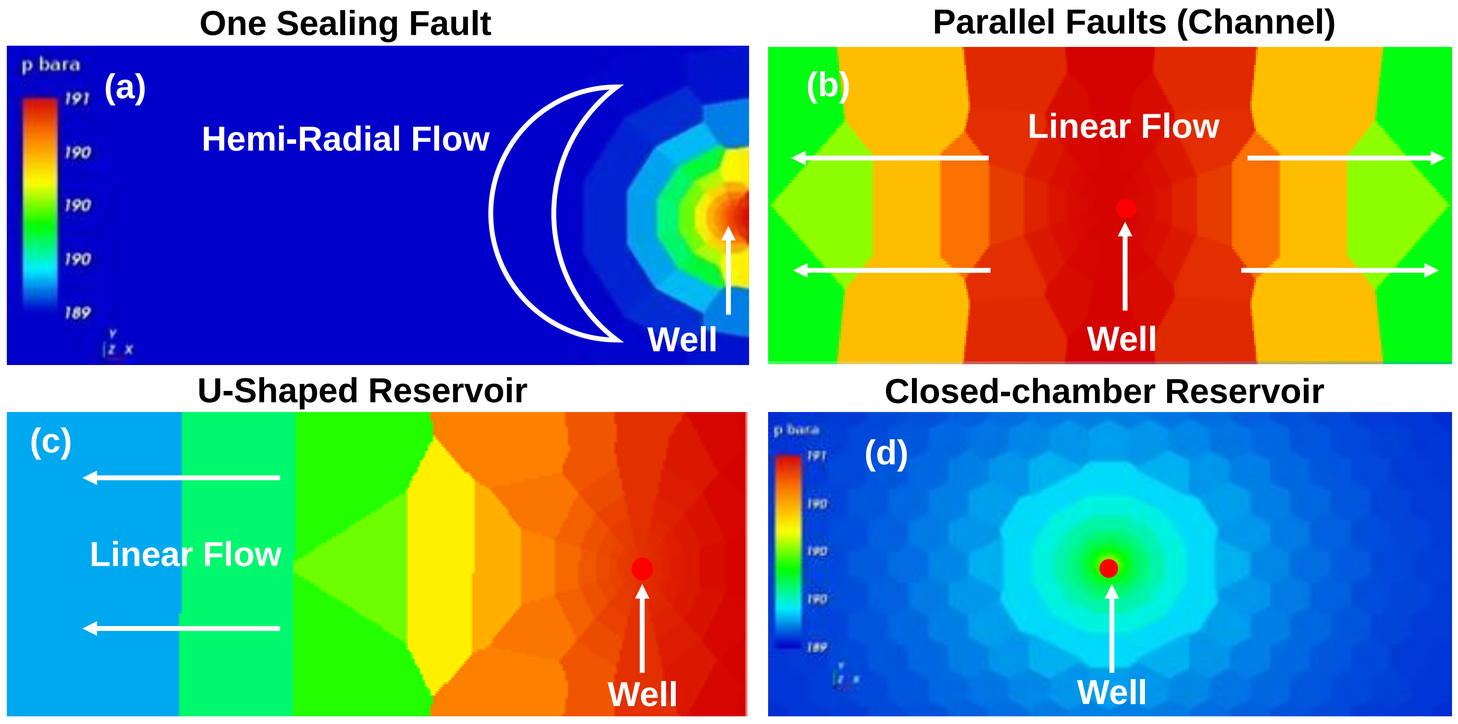

Figure 1:Pressure distributions for reservoirs with (a) one sealing fault (b) parallel faults (c) U-shaped reservoir (d) closed-chamber reservoir

RESULTS

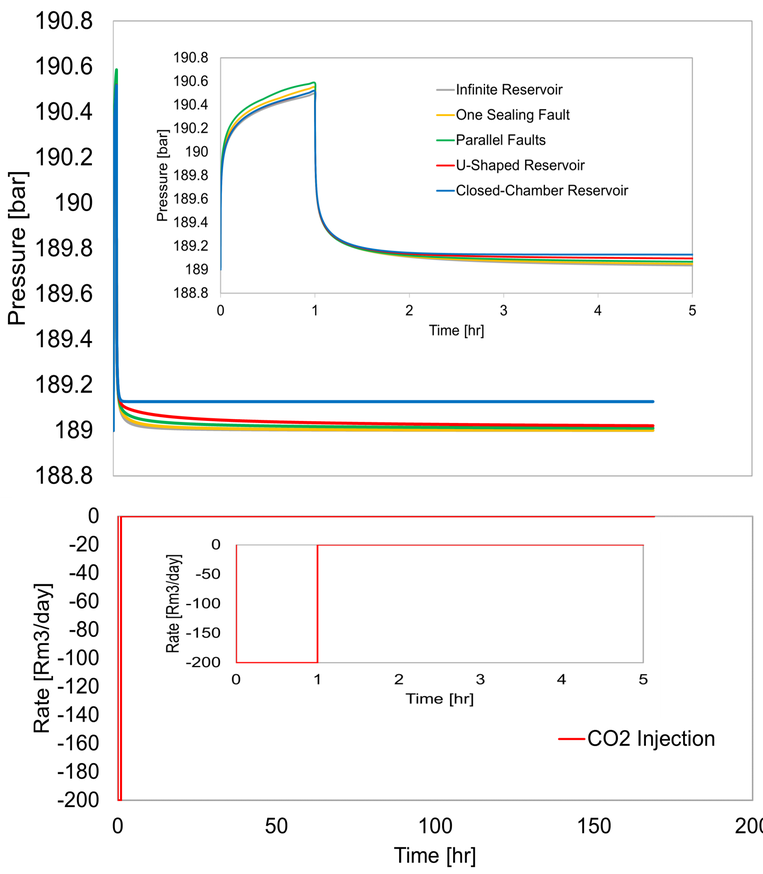

Figure 2: History plot of CO_2 injection into saline aquifer: simulated pressure responses for different reservoir configurations

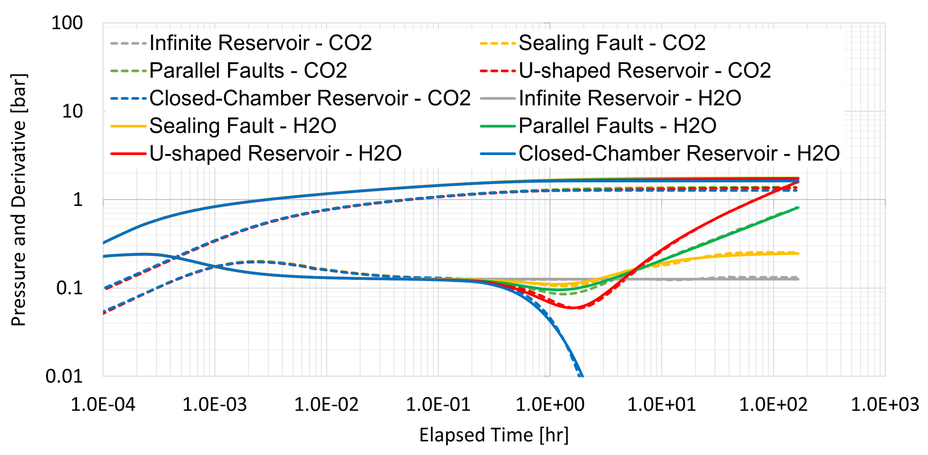

Figure 3: Pressure and derivatives for the fall-off transients for water and CO_2 injection tests for the reservoir configurations in Figure 1

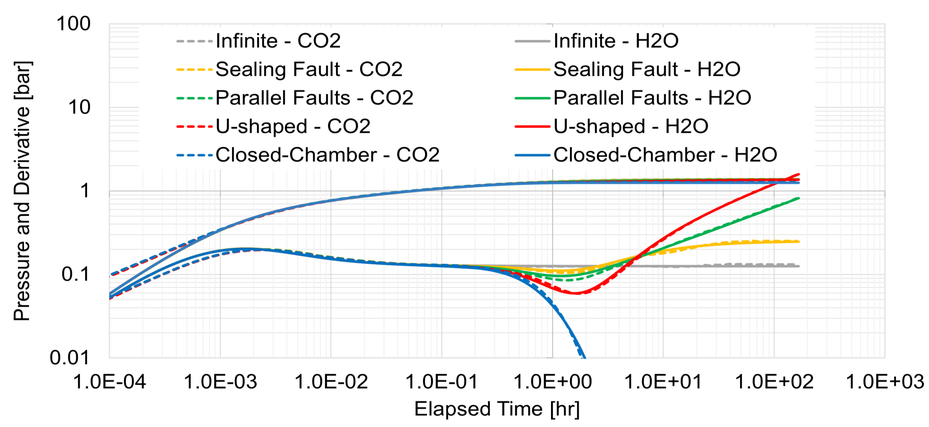

Figure 4: Pressure fall-off responses and their derivatives for CO_2 injection tests (CO_2) matched with the brine-replica approach

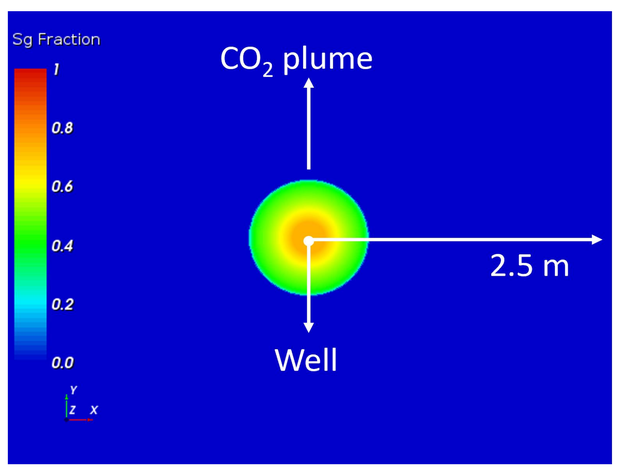

Figure 5: CO_2 plume localized near wellbore after injection

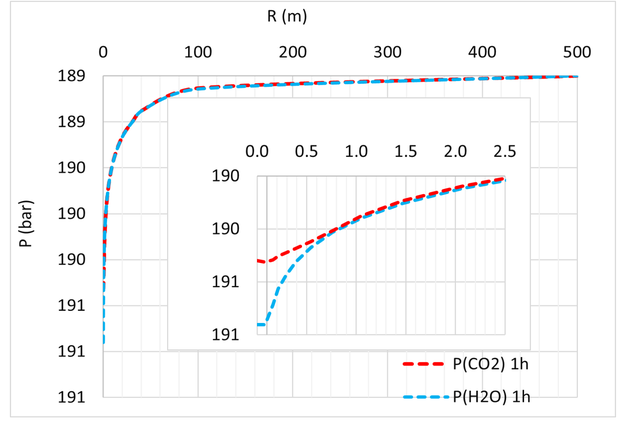

Figure 6: Comparing pressure distributions after water and CO_2 injections zooming near well

CONCLUSIONS

- Well test designs in this study can provide information related to reservoir flow capacity and flow barriers key parameters for injectivity and storage capacity
- It was confirmed that brine-replica solution can be used to interpret CO_2 injection tests (flow capacity and boundaries)
- The evaluation is driven by pressure derivative interpretation, while further match of the pressure drop, and early time derivative may be achieved via skin and wellbore storage adjustments
- Comparative analysis shows that H_2O injection/ brine production is the best candidate to appropriately test wells before main CO_2 injection phase

ACKNOWLEDGEMENTS

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