

Water Injection Wellbore Temperature Profile @model

Motivation

For the stabilized flow the wellbore pressure profile is constant and wellbore temperature profile is changing very slowly.

This allows solving the pressure-temperature problem iteratively:

1. Iterations
 - Water Injection Wellbore Temperature Profile @model
 - Water Injection Wellbore Pressure Profile @model
2. Iteration
 - Water Injection Wellbore Temperature Profile @model
 - Water Injection Wellbore Pressure Profile @model
3. Iteration ...

Outputs

| | |
|--------|--|
| $T(l)$ | Temperature distribution along the wellbore trajectory |
|--------|--|

Inputs

| | | | |
|--------------|--------------------|-------------|---|
| T_s | Intake temperature | $z(l)$ | Pipeline trajectory TVDss |
| p_s | Intake pressure | $\theta(l)$ | Pipeline trajectory inclination, $\cos \theta(l) = \frac{dz}{dl}$ |
| q_s | Intake flowrate | d | Flow pipe diameter (tubing or casing depending on where flow occurs) |
| $\rho(T, p)$ | Fluid density | ϵ | Inner pipe wall roughness |
| $\mu(T, p)$ | Fluid viscosity | | |

Assumptions

| | | |
|-----------------------|---|---|
| Stationary fluid flow | Isothermal or Quasi-isothermal conditions | Constant cross-section pipe area A along hole |
|-----------------------|---|---|

| | | |
|--|---|--|
| Incompressible fluid $\rho(T, p) = \rho_s = \text{const}$ | Isoviscous $\mu(T, p) = \mu_s = \text{const}$ | |
|--|---|--|

The stabilized water injection profile satisfies the assumptions of the [Stationary Quasi-Isothermal Incompressible Isoviscous Pipe Flow Pressure Profile @model](#).

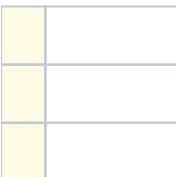
The water injection [wellbore](#) temperature profile can be split into the following components:

- Upward vertical heat conduction from Earth's Centre towards Earth's surface leading to a static geothermal profile
- Upward & Downward vertical heat conduction from reservoir with non-geothermal temperature (invaded by injection water)
- Heat exchange between [wellbore](#) fluid and surrounding rocks above and below the invaded reservoir
- The temperature in water invaded reservoir stays constant from top to bottom

Equations

| | |
|-----|----------------------|
| (1) | $T(l) = T_s + \dots$ |
|-----|----------------------|

where



See Also

[Petroleum Industry](#) / [Upstream](#) / [Subsurface E&P Disciplines](#) / [Production Technology](#) / [Well Flow Performance](#) / [Lift Curves \(LC\)](#) / [Water Injection Wellbore Profile @model](#)

[[Water Injection Wellbore Pressure Profile @model](#)] [[Homogenous Pipe Flow Temperature Profile @model](#)]

