

Numerical Exercise

Last Edited: 6 April, 2022

We have a square porous media with 40-acre surface area and initial pressure of 4500 psi. The well is located on the center of reservoir producing at a constant flow rate of 800 STB/day. The reservoir has the following properties:

$k = 200 \text{ mD}$	$B_o = 1.2 \text{ bbl/STB}$
$c_t = 25 \times 10^{-6} \text{ psi}^{-1}$	$\mu_o = 1.5 \text{ cp}$
$\phi = 0.15$	$r_w = 0.25 \text{ ft}$
$h = 30 \text{ ft}$	$A = 40 \text{ acres}$

- 1) Determine the upper time limit when transient solution is valid, and for times when the exponential integral solution is valid, plot well pressure vs. time, Fig. 1.
- 2) Determine the lower time limit when you can start using pseudo-steady state solution, and for times when the solution is valid, plot well pressure vs. time, Fig. 1.
- 3) Discretize the reservoir into 10x10 grids and use finite difference method to calculate the well pressure vs. time, Fig.2. Compare the initial and late time steps with respect to the solution on the first and second bullets, respectively.

We are going to go over third bullet in the class, and finish the exercise by the end of the semester.

Figure 1: Analytical solutions:

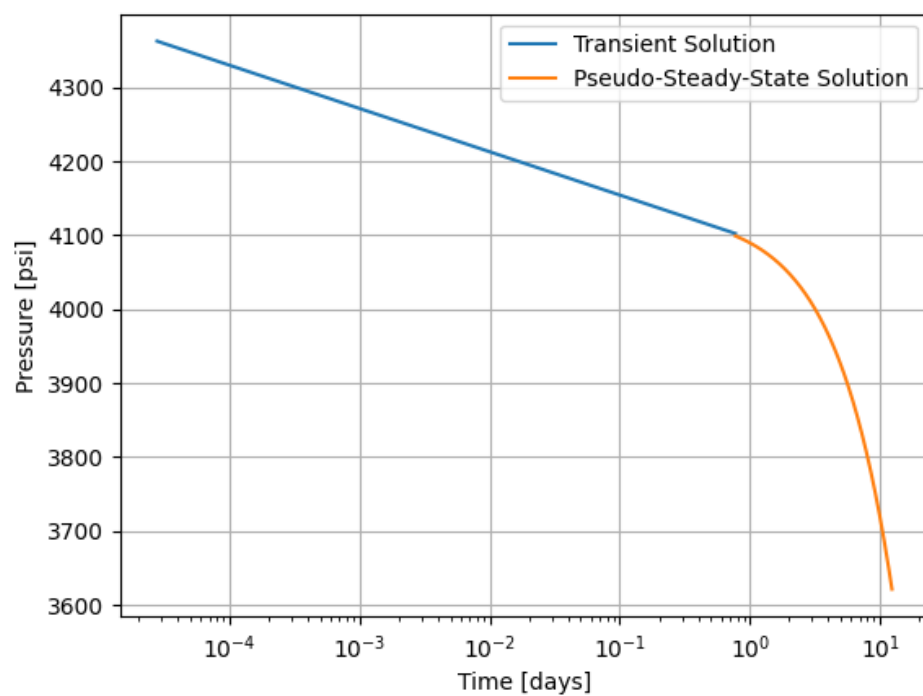


Figure 2: Discretization sample:

