NUMERICAL RESERVOIR SIMULATION
COMPUTER PROJECT 3

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March 20, 2020

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1 Introduction

The reservoir in this project has homogeneous properties in permeability, porosity, thickness and block dimensions, but it contains three phase including oil, gas and water.
A computer program has been constructed to generate the Jacobian matrix and residual vector that can be employed the Newton-Raphson method to solve highly non-linear system of equations.

2 Result

2.1 Pressure and saturate after five days

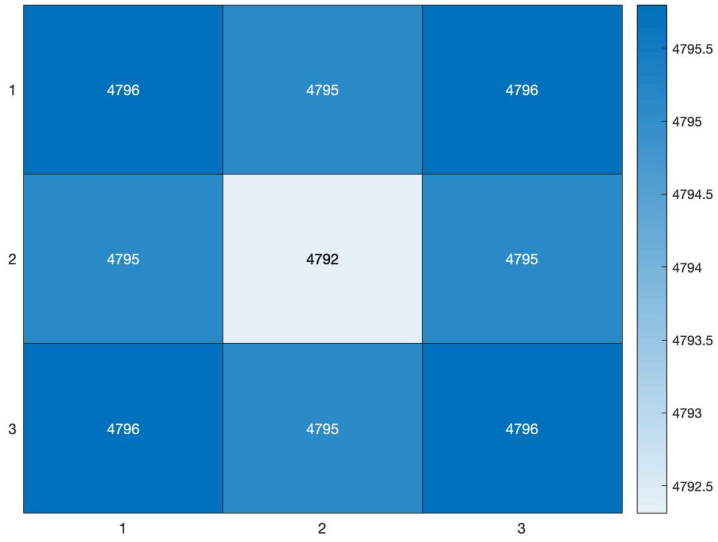

Figure 1: Pressure distribution after convergence

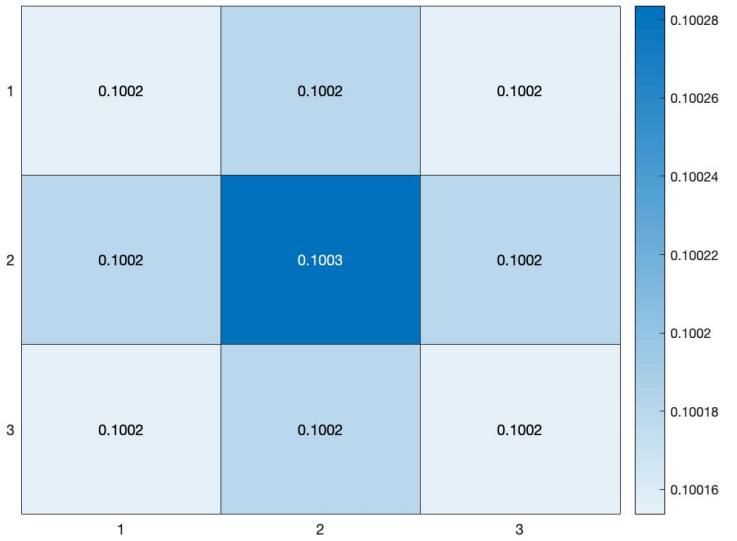

Figure 2: Gas saturation after convergence

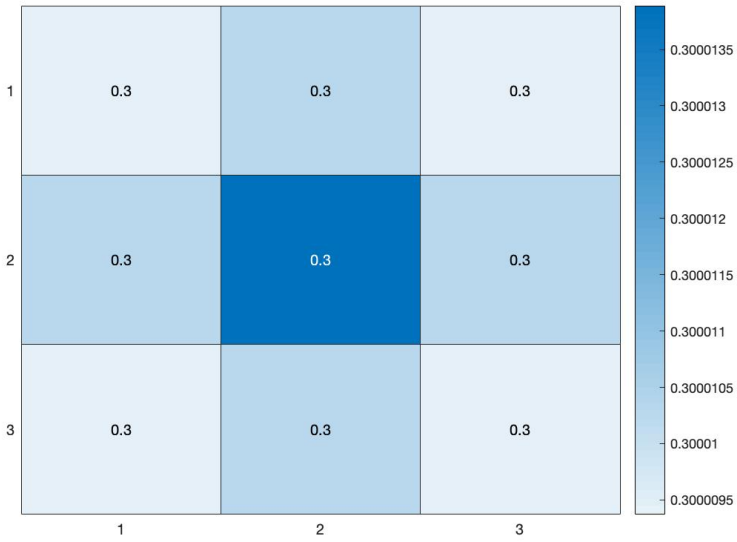

Figure 3: Water saturation after convergence

2.2 Material balance check

Incremental material balance check of oil : 1
Incremental material balance check of gas : 1
Incremental material balance check of water : 1

3 Summary and conclusion

This project is constructed for multi-phase fluid reservoir in 2-D. A simulation is run for five days and validate with exist solutions.
The material balance check on each phase is generated with values of 1.

My implementation

I have used Matlab and Julia to solve the computer project 3.
The main file is "**cp3_solve.m**"
The file "**final_cp3.jl**" my implementation on Julia

References

[1] Numerical reservoir simulation slides. Dr-Miao Zhang

[2] Turgay Ertekin, Jamal H. Abou-Kassem, Gregory R.King. *Basic applied reservoir simulation*. Chaper 9, Multiphase flow simulation in petroleum reservoir, 231–310.