King Saud University

Petroleum and Natural Gas Engineering

PGE 489: **Well Stimulation and Sand Production Management**

Due: **March 29, 2016**

Homework-1

Q1

If r_w=0.328 ft, h=165 ft, h_w=75 ft, and z_w=82.5 ft (midpoint of the reservoir), calculate the partial completion skin effect for a vertical well.

Q2

At which angle of well deviation would the contribution from s_θ nullify the effects of s_c (i.e., $s_{c+\theta} \approx 0$)?

Q3

Calculate and plot the maximum tubing injection pressure and initial injection rate for matrix acidizing conditions if all parameters are the same as in Example 14-5, except instead of 2-in. tubing with a relative roughness of 0.001, injection is through:

(a) 1-in.-I.D. tubing, $\epsilon = 0.001$
(b) 3-in.-I.D. tubing, $\epsilon = 0.001$
(c) 2-in.-I.D. tubing, $\epsilon = 0.0001$

Notes:

1- For reference use exersice-2 in tutorial-1 or example 14-5 in the textbook page 362.
2- Assume acid injection rate ranging from 0.5 to 10 with 0.5 increment.
3- Plot the results for the three tubing pipes in the same graph and comment.

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Q4

Calculate the radius of wormhole penetration using Daccord's and the volumetric model for the injection of 100 gal/ft of 28% HCl at 0.05 bpm/ft into a 10% porosity limestone formation. The molecular diffusion coefficient is 10^{-9} m^2/sec, and 1.5 pore volumes of acid are required for wormhole breakthrough in a core flood.

Q5

Repeat Q4 but for dolomite in which 10 pore volumes of acid are needed for breakthrough.

Q6

A well has a skin effect of 10 due to damage extending 2 ft beyond a 0.328-ft-radius wellbore. The undamaged reservoir permeability is 200 md. For the acidizing conditions described in Example 15-3, calculate and plot the skin evolution up to 100 gal/ft using Daccord's model.

Note:

For reference use exersice-2 in tutorial-4 or example 15-3 in the textbook page 404.

Q7

Repeat Q6 but using the volumetric model.

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