

**HW#12****Assigned: Thursday, November 5, 2009****Due: Thursday, December 3, 2009**

Write the finite difference formulation for the 1-D problem. For the pressure equation, collect terms for  $\Delta_t P_i$ ,  $\Delta_t P_{i+1}$ , and  $\Delta_t P_{i-1}$ , with all other terms on the right-hand side ( $R_p$ ). For the saturation equation, assume  $P_o^{[n+1]}$  is known. Collect terms for  $\Delta_t S_{w,i}$ ,  $\Delta_t S_{w,i+\frac{1}{2}}$ ,  $\Delta_t S_{w,i+1}$ ,  $\Delta_t S_{w,i-\frac{1}{2}}$ , and  $\Delta_t S_{w,i-1}$ , with all other terms on the right hand side ( $R_s$ ). Please note that you will need the 2-D formulation for the term project.

- a) Write the 1-D formulation for the fully implicit sequential algorithm (project option 3).
- b) Write the 1-D formulation for the fully implicit coupled algorithm (project option 4).