

NPTEL Online Certification

COMPUTATIONAL HYDRAULICS

Week 8 : Assignment Solution

July 24-October 13, 2017

NOTE: Attempt **ALL** questions. Make suitable assumptions, wherever necessary.

1. Report the value of $h(201)$ for GVF using forward euler. Use the source code *forward_euler.sci* with $mnode=201$ and $Lx=200$.
 - **0.6450995**
2. Report the value of $h(201)$ for GVF using modified euler (1st). Use the source code *modified_euler_1st.sci* with $mnode=201$ and $Lx=200$.
 - **0.6404487**
3. Report the value of $h(201)$ for GVF using modified euler (2nd). Use the source code *modified_euler_2nd.sci* with $mnode=201$ and $Lx=200$.
 - **0.6404198**
4. Report the value of $h(201)$ for GVF using RK2. Use the source code *RK2.sci* with $mnode=201$ and $Lx=200$.
 - **0.6404392**
5. Report the value of $h(201)$ for GVF using RK4. Use the source code *RK4.sci* with $mnode=201$ and $Lx=200$.
 - **0.6404033**
6. Report the value of $h(10,10)$ for steady two dimensional groundwater flow through confined aquifer using finite volume method. Use the source code *unsteady_2D_fvm_conf_implicit_iterative* with $mnode=31$, $mnode=21$. The top left boundary height is 95m.
 - **90.74551**
7. Report the value of $h(10,10)$ for steady two dimensional groundwater flow through confined aquifer using finite volume method. Use the source code *unsteady_2D_fvm_conf_implicit_iterative* with $mnode=31$, $mnode=21$. The top left boundary height is 95m. The value of S and T are respectively $10e-05$ and 100.
 - **90.750893**
8. Report the value of $h(10,10)$ for steady two dimensional groundwater flow through confined aquifer using finite volume method. Use the source code *unsteady_2D_fvm_conf_implicit_iterative* with $mnode=31$, $mnode=21$. The convergence criteria is $1e-3$.
 - **88.98436**
9. Report the value of $h(10,10)$ for steady two dimensional groundwater flow through confined aquifer using finite volume method. Use the source code *unsteady_2D_fvm_conf_implicit_iterative* with $mnode=31$, $mnode=21$. The convergence criteria is $1e-4$.
 - **88.551547**

10. Report the value of $h(10,10)$ for steady two dimensional groundwater flow through unconfined aquifer using finite volume method. Use the source code *unsteady-2D_fvm_unconf_implicit_iterative* with `mnode=31`, `nnode=21`. The value of K_x and K_y are 20 and 20.

- **88.523143**

Note: For first 5 cases, the water level is almost identical for whatever method is used. The computational overhead and accuracy is dependent on the convergence criteria for implicit flow cases.
