NPTEL Online Certification

COMPUTATIONAL HYDRAULICS

Week 9 : Assignment Solution
July 24-October 13, 2017

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

1. Find out the value of flow-depth $y$ at $x=200m$ for the GVF problem discussed in the lecture by using the following Butcher Tableau,

\[
\begin{array}{c|ccc}
0 & 0 & 0 \\
\frac{2}{3} & \frac{1}{4} & \frac{1}{4} \\
\frac{1}{4} & \frac{1}{4} & \frac{1}{4} \\
\end{array}
\]

This is a Third order Runge-Kutta (RK3) approximation. (Hint: Modify the RK4Implicit.sci)
- $0.6404425$

2. Find out the value of flow-depth $y$ at $x=150m$ for the GVF problem discussed in the lecture by using the following Butcher Tableau,

\[
\begin{array}{c|ccc}
0 & \frac{1}{4} & \frac{1}{4} & \frac{1}{12} \\
\frac{1}{3} & \frac{1}{2} & \frac{1}{2} & \frac{1}{12} \\
\frac{1}{4} & \frac{1}{4} & \frac{1}{4} & \frac{1}{4} \\
\end{array}
\]

This is a Third order Runge-Kutta (RK3) approximation. (Hint: Modify the RK4Implicit.sci)
- $0.7269076$

3. Find out the value of flow-depth $y$ at $x=100m$ for the GVF problem discussed in the lecture by using the following Butcher Tableau,

\[
\begin{array}{c|ccc}
\frac{1}{3} & \frac{1}{4} & 0 \\
\frac{1}{4} & \frac{1}{4} & 0 \\
\frac{1}{4} & \frac{1}{4} & \frac{1}{4} \\
\end{array}
\]

This is a Third order Runge-Kutta (RK3) approximation. (Hint: Modify the RK4Implicit.sci)
- $0.7629011$

4. Find out the value of flow-depth $y$ at $x=75m$ for the GVF problem discussed in the lecture by using the following Butcher Tableau,

\[
\begin{array}{c|ccc}
\frac{1}{3} & \frac{5}{12} & -\frac{1}{12} \\
\frac{1}{4} & \frac{1}{4} & \frac{1}{4} \\
\frac{1}{4} & \frac{1}{4} & \frac{1}{4} \\
\end{array}
\]

This is a Third order Runge-Kutta (RK3) approximation. (Hint: Modify the RK4Implicit.sci)
- $0.775069$