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NPTEL

reviewer4@nptel.iitm.ac.in ▼

Courses » Introduction to Finite Volume Methods II

Announcements **Course** Ask a Question Progress FAQ

Unit 5 - week 4 - Convection term discretisation + High resolution schemes

Register for
Certification exam

Course outline

How to access
the portal

Week 1 - Linear
solvers

Week 2 - Linear
solvers +
Convection term
discretisation

Week 3 -
Convection term
discretisation

week 4 -
Convection term
discretisation +
High resolution
schemes

Convection
term
discretisation-VIII

Convection
term
discretisation-IX

High Resolution
Schemes-I

High Resolution
Schemes-II

Assignment 4

The due date for submitting this assignment has passed.

As per our records you have not submitted this **Due on 2019-02-27, 23:59 IST.**
assignment.

1) Central difference discretisation of the convection term can lead to unphysical solutions **1 point**
because

- Truncation error for central difference scheme is first order
- Truncation error for central difference scheme is second order
- Central difference scheme has no inherent convective stability for odd derivative
- Central difference scheme has no inherent convective stability for even derivative

No, the answer is incorrect.

Score: 0

Accepted Answers:

Central difference scheme has no inherent convective stability for odd derivative

2) The values at the faces in a second order upwind scheme is obtained by **1 point**

- Interpolation of values from upwind and far-upwind nodes
- Interpolation of values from downwind and upwind nodes
- Extrapolation of values from upwind and far-upwind nodes
- Extrapolation of values from downwind and upwind nodes

No, the answer is incorrect.

Score: 0

Accepted Answers:

Extrapolation of values from upwind and far-upwind nodes

3) Which statement is true for second order upwind scheme? **1 point**

$$\frac{\partial \rho \phi}{\partial t} = -\frac{\partial \rho u \phi}{\partial x} + \frac{\partial}{\partial x} \left(\Gamma \frac{\partial \phi}{\partial x} \right) + Q = RHS$$

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|--|--|--|---------|
| <input type="radio"/> Solution for Assignment 4 | ce De | <p>No, the answer is incorrect. Score: 0</p> <p>Accepted Answers: For stability, $\frac{\partial(RHS)}{\partial\phi_c} < 0$ in uniform velocity</p> | |
| <p>week 5 - High resolution schemes + Temporal discretisation</p> | 4) QUICK scheme is | <input type="radio"/> first order accurate <input type="radio"/> second order accurate <input type="radio"/> third order accurate <input type="radio"/> fourth order accurate | 1 point |
| <p>week 6 - Temporal discretisation + Discretisation of the Source Term, Relaxation and Other Details</p> | <p>No, the answer is incorrect. Score: 0</p> <p>Accepted Answers: third order accurate</p> | 5) FROMM scheme is | 1 point |
| <p>week 7 - Fluid Flow Computation: Incompressible Flows</p> | <input type="radio"/> first order accurate <input type="radio"/> second order accurate <input type="radio"/> third order accurate <input type="radio"/> fourth order accurate | <p>No, the answer is incorrect. Score: 0</p> <p>Accepted Answers: second order accurate</p> | 1 point |
| <p>week 8 - Fluid Flow Computation and Some Advanced Topics</p> | 6) At small Peclet number (Pe=1), accuracy of the higher order schemes is as follows | <input type="radio"/> Upwind < SOU < FROMM < QUICK <input type="radio"/> Upwind > SOU > FROMM > QUICK <input type="radio"/> Upwind < FROMM < SOU < QUICK <input type="radio"/> Upwind > FROMM > SOU > QUICK | 1 point |
| <p>No, the answer is incorrect. Score: 0</p> <p>Accepted Answers: Upwind < SOU < FROMM < QUICK</p> | 7) At large Peclet number (Pe=10), stability of the higher order schemes is as follows | <input type="radio"/> Upwind < SOU < QUICK < CD <input type="radio"/> Upwind > SOU > QUICK > CD <input type="radio"/> Upwind < QUICK < SOU < CD <input type="radio"/> Upwind > QUICK > SOU > CD | 1 point |
| <p>No, the answer is incorrect. Score: 0</p> <p>Accepted Answers: Upwind > SOU > QUICK > CD</p> | 8) Reasons for instability of higher order schemes at high Peclet number could be | <input type="radio"/> Imposed boundary condition at the exit from the domain <input type="radio"/> Large gradients in the domain such as presence of shock wave | 1 point |

Both of the above

None of the above

No, the answer is incorrect.

Score: 0

Accepted Answers:

Both of the above



← Previous Page

End →

