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reviewer1@nptel.iitm.ac.in ▼

Courses » Computational Hydraulics

Announcements

Course

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Mentor

Unit 5 - Week 4

Course outline

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Week 4

- Lecture 16: Finite Volume Method - Conservation Law
- Lecture 17: Upwind Approach
- Lecture 18: Godunov Approach
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- Quiz : Week 4 Assignment
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Week 4 Assignment

The due date for submitting this assignment has passed. **Due on 2017-09-07, 11:59 IST.**

Submitted assignment

1) A system (m equations) is hyperbolic at a point (x,t) for conservation law, if **1 point**

- Jacobian matrix of flux term (m numbers) with respect to variables has real eigenvalues
- Jacobian matrix of flux term (m numbers) with respect to variables has linearly independent eigenvectors
- Jacobian matrix of flux term (m numbers) with respect to variables has linearly dependent eigenvectors

No, the answer is incorrect.

Score: 0

Accepted Answers:

Jacobian matrix of flux term (m numbers) with respect to variables has real eigenvalues

Jacobian matrix of flux term (m numbers) with respect to variables has linearly independent eigenvectors

2) Total Variation Diminishing (TVD) scheme is **1 point**

- nonmonotonic
- monotonicity preserving method

No, the answer is incorrect.

Score: 0

Accepted Answers:

monotonicity preserving method

3) Slope at P^{th} cell in numerical flux calculation with high resolution methods for Fromm method can be calculated as, **1 point**

-
- $\sigma_P^n = 0$
- $\sigma_P^n = \frac{\sigma_E^n - \sigma_W^n}{2\Delta x}$
- $\sigma_P^n = \frac{\sigma_P^n - \sigma_W^n}{2\Delta x}$
- $\sigma_P^n = \frac{\sigma_E^n - \sigma_P^n}{2\Delta x}$

No, the answer is incorrect.

Score: 0

Accepted Answers:

$\sigma_P^n = \frac{\sigma_E^n - \sigma_W^n}{2\Delta x}$

Week 11

Week 12

4) Numerical flux function for Godunov method in case of one dimensional conservational law with flux term $\mathcal{F}_\phi = a\phi$, [where $a = \text{constant}$, $a^+ = \max(a,0)$, $a^- = \min(a,0)$] is **1.5 points**

$$\bar{\mathcal{F}}_\phi(\phi_e(0)) = a^- \phi_E^n + a^+ \phi_P^n$$

$$\bar{\mathcal{F}}_\phi(\phi_e(0)) = a^- \phi_P^n + a^+ \phi_E^n$$

$$\bar{\mathcal{F}}_\phi(\phi_w(0)) = a^- \phi_P^n + a^+ \phi_W^n$$

$$\bar{\mathcal{F}}_\phi(\phi_w(0)) = a^- \phi_W^n + a^+ \phi_P^n$$

No, the answer is incorrect.

Score: 0

Accepted Answers:

$$\bar{\mathcal{F}}_\phi(\phi_e(0)) = a^- \phi_E^n + a^+ \phi_P^n$$

$$\bar{\mathcal{F}}_\phi(\phi_w(0)) = a^- \phi_P^n + a^+ \phi_W^n$$

5) Numerical flux function for upwind method in case of one dimensional conservational law with flux term $\mathcal{F}_\phi = a\phi$ (where $a = \text{constant}$) is **1.5 points**

$$\bar{\mathcal{F}}_\phi(\phi_P^n, \phi_E^n) = a\phi_E^n \text{ for } a < 0$$

$$\bar{\mathcal{F}}_\phi(\phi_P^n, \phi_E^n) = a\phi_P^n \text{ for } a > 0$$

$$\bar{\mathcal{F}}_\phi(\phi_P^n, \phi_W^n) = a\phi_P^n \text{ for } a < 0$$

$$\bar{\mathcal{F}}_\phi(\phi_P^n, \phi_W^n) = a\phi_W^n \text{ for } a > 0$$

 All of the above

No, the answer is incorrect.

Score: 0

Accepted Answers:

All of the above

6) Lax-Friedrichs scheme for one dimensional conservational law with flux term $\mathcal{F}_\phi = a\phi$ (where $a = \text{constant}$) is **1 point**

Unconditionally stable

Unconditionally unstable

Conditionally stable

Conditionally unstable

No, the answer is incorrect.

Score: 0

Accepted Answers:

Conditionally stable

Conditionally unstable

7) In Riemann problem, variable value **1 point**

is same on both sides of a face under consideration.

is different on both sides of a face under consideration.

No, the answer is incorrect.

Score: 0

Accepted Answers:

is different on both sides of a face under consideration.

8) Partition of unity means **1 point**

- Summation of all shape functions within support domain except the point under consideration is equal to 1.
- Summation of all shape functions within support domain is equal to 1.
- Shape function value at point under consideration is equal to 1.

No, the answer is incorrect.

Score: 0

Accepted Answers:

Summation of all shape functions within support domain is equal to 1.

9) Polynomial basis of order 2 in one dimension contains

1 point

- 1
- x
- $1 \ x \ x^2$
- $x \ x^2$
- $1 \ x^2$

No, the answer is incorrect.

Score: 0

Accepted Answers:

1 $x \ x^2$

10) In mesh-free method, node spacing (d_c) in two-dimension depends on

1 point

- Volume of estimated support domain
- Area of estimated support domain
- Length of estimated support domain

No, the answer is incorrect.

Score: 0

Accepted Answers:

Area of estimated support domain

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