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NPTEL

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Courses » Introduction to Finite Volume Methods II

Announcements **Course** Ask a Question Progress FAQ

Unit 9 - week 8 - Fluid Flow Computation and Some Advanced Topics

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

week 5 - High
resolution
schemes +
Temporal
discretisation

week 6 -
Temporal
discretisation +
Discretisation of
the Source Term,
Relaxation and
Other Details

Assignment 8

The due date for submitting this assignment has passed.

As per our records you have not submitted this **Due on 2019-03-27, 23:59 IST.**
assignment.

1) Which of the statement is true in the context of checkerboard problem **1 point**

- The problem arises due to decoupling between the pressure and velocity field
- This can be avoided if the different variables are stored at staggered locations
- Both of the above
- None of the above

No, the answer is incorrect.

Score: 0

Accepted Answers:

Both of the above

2) In SIMPLE algorithm, pressure correction equation is solved to satisfy **1 point**

- Continuity equation
- Momentum equation
- Energy equation
- All of the above

No, the answer is incorrect.

Score: 0

Accepted Answers:

Continuity equation

3) The SIMPLE algorithm on staggered grid solves **1 point**

- first pressure correction equation and then momentum equation
- first momentum equation and then pressure correction equation
- both pressure correction and momentum equation simultaneously

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**Flow
Computation
and Some
Advanced
Topics**

- Fluid Flow
Computation:
Incompressible
Flows-VI
- Fluid Flow
Computation:
Incompressible
Flows-VII
- Fluid Flow
Computation:
Incompressible
Flows-VIII
- Fluid Flow
Computation:
Compressible
Flows-I
- Some
Advanced
Topics-I
- Quiz :
Assignment 8
- Introduction to
Finite Volume
Methods II :
Feedback For
Week 8
- Solution for
Assignment 8

4) Disadvantages of using the staggered grid is

1 point

- large number of staggered grids are required with the velocity components integrated over different elements in 2D or 3D
- Large amount of memory requirement to store velocity, pressure and other variables
- It becomes complex for non-cartesian grids and unstructured grids
- All of the above

No, the answer is incorrect.

Score: 0

Accepted Answers:

All of the above

5) At a stationary wall for incompressible flow, boundary conditions for velocity (\vec{V}_b) and pressure (p) are

1 point

- $\vec{V}_b = 0$
- $\frac{\partial \vec{V}_b}{\partial n} = 0$ where n means the distance locally normal to the wall
- $p = 0$
- $\frac{\partial p}{\partial n} = 0$ where n means the distance locally normal to the wall

No, the answer is incorrect.

Score: 0

Accepted Answers:

$$\vec{V}_b = 0$$

$$\frac{\partial p}{\partial n} = 0 \text{ where } n \text{ means the distance locally normal to the wall}$$

6) Which statement is true for PISO algorithm

1 point

- One or more PRIME steps are applied in the first step to account for $H_c[v']$
- The second step is similar to SIMPLE algorithm
- Both of the above
- None of the above

No, the answer is incorrect.

Score: 0

Accepted Answers:

None of the above

7) The smallest turbulent eddies are characterized by the Kolmogorov micro length (η) given by

1 point

- $\eta = \left(\frac{\nu^3}{\epsilon}\right)^{\frac{1}{4}}$
- $\eta = \left(\frac{\nu}{\epsilon^3}\right)^{\frac{1}{4}}$
- $\eta = \left(\frac{\nu^3}{\epsilon}\right)^{\frac{1}{2}}$
-

$$\eta = \left(\frac{\nu}{\epsilon^3}\right)^{\frac{1}{2}}$$

No, the answer is incorrect.

Score: 0

Accepted Answers:

$$\eta = \left(\frac{\nu^3}{\epsilon}\right)^{\frac{1}{4}}$$

8) Boussinesq hypothesis models Reynolds stress

1 point

- directly proportional to the mean velocity gradient
- proportional to the square of mean velocity gradient
- proportional to the inverse of mean velocity gradient
- None of the above

No, the answer is incorrect.

Score: 0

Accepted Answers:

directly proportional to the mean velocity gradient

Previous Page

End