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Courses » Introduction to Finite Volume Methods II

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Unit 3 - Week 2 - Linear solvers + Convection term discretisation

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Certification exam

Course outline

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Week 2 - Linear
solvers +
Convection term
discretisation

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- Convection term discretisation-I
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Week 2

Assignment 2

The due date for submitting this assignment has passed.

As per our records you have not submitted this **Due on 2019-02-13, 23:59 IST.** assignment.

1) For solving $A\phi = b$ using an iterative solver such that $\phi^{(n)} = B\phi^{(n-1)} + Cb$. **1 point**
Which is true?

$B + CA = I$ ensures that the solution will not change with subsequent iterations once exact solution is reached.

Spectral radius of B should be less than 1

Some sort of stopping criteria is necessary for checking convergence of the iterations.

All of the above

No, the answer is incorrect.

Score: 0

Accepted Answers:

All of the above

2) For Jacobi method, $M\phi^{(n)} = N\phi^{(n-1)} + b$ is used to solve $A\phi = b$ and A is **1 point**
written as $A = L + D + U$, then

$M = D$ and $N = L + U$

$M = D^{-1}$ and $N = L + U$

$M = (D + L)$ and $N = U$

$M = (D + L)^{-1}$ and $N = U$

No, the answer is incorrect.

Score: 0

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week 5 - High resolution schemes + Temporal discretisation

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

week 7 - Fluid Flow Computation: Incompressible Flows

week 8 - Fluid Flow Computation and Some Advanced Topics

$$M = D \text{ and } N = L + U$$

$$M = D^{-1} \text{ and } N = L + U$$

$$M = (D + L) \text{ and } N = U$$

$$M = (D + L)^{-1} \text{ and } N = U$$

No, the answer is incorrect.

Score: 0

Accepted Answers:

$$M = (D + L) \text{ and } N = U$$

4) If \bar{L} is the factorized sparse lower triangular matrix for a symmetric matrix A obtained using $ILU(0)$ factorization, then the preconditioning matrix P for A is given by

1 point

$$\bar{L}$$

$$\bar{L}^T$$

$$\bar{L}\bar{L}^T$$

$$\bar{L}^T\bar{L}$$

No, the answer is incorrect.

Score: 0

Accepted Answers:

$$\bar{L}\bar{L}^T$$

5) What is the advantage of using $ILU(0)$ factorization?

1 point

Preconditioner has only twice the size of the original matrix

It mimics the non-zero sparsity of the original matrix

Convergence of the iterative method remains same compared with complete LU factorization

None of the above

No, the answer is incorrect.

Score: 0

Accepted Answers:

It mimics the non-zero sparsity of the original matrix

6) Which is true for $DILU$ factorization?

1 point

In the $DILU$ factorization the fill-in of the off-diagonal elements is eliminated and only the diagonal elements are modified

$DILU$ uses more memory than other ILU factorizations

Both of the above

None of the above

No, the answer is incorrect.

Score: 0

Accepted Answers:

In the $DILU$ factorization the fill-in of the off-diagonal elements is eliminated and only the diagonal elements are modified

7) Necessary condition for using gradient methods for solving system of linear equations $\mathbf{Ax} = \mathbf{b}$ **1 point**

Matrix \mathbf{A} should be symmetric

Matrix \mathbf{A} should be positive definite

The quadratic minimization function $Q(\phi)$ has a global minimum

All of the above

No, the answer is incorrect.

Score: 0

Accepted Answers:
All of the above

8) If matrix \mathbf{P} and \mathbf{A} are symmetric, then $\mathbf{P}^{-1}\mathbf{A}$ is **1 point**

Necessarily symmetric

Maybe symmetric


Necessarily anti-symmetric

Diagonal matrix

No, the answer is incorrect.

Score: 0

Accepted Answers:
Maybe symmetric

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