

Unit 8 - Week 6: Hyperbolic Equations

Course outline

How does an NPTEL online course work?

Week 0: Prerequisite

Week 1: Introduction to Computational Fluid Dynamics

Week 2: Classification of PDEs

Week 3: Finite Difference Method

Week 4: Elliptic Equations

Week 5: Parabolic Equations

Week 6: Hyperbolic Equations

● Lec 1: Finite difference formulations of the first order wave equation: Explicit Method

● Lec 2: Finite difference formulations of the first order wave equation: Implicit Method

○ Quiz : Assignment 6

○ Feedback form for week 6

Week 7: Stability Analysis

Week 8: Vorticity-Stream Function Formulation

Week 9: MAC Algorithm

Week 10: Finite Volume Method - I

Week 11: Finite volume method - II

Week 12: SIMPLE Algorithm

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Assignment 6

The due date for submitting this assignment has passed.
As per our records you have not submitted this assignment.

Due on 2020-03-11, 23:59 IST.

1) Which among the following schemes is unconditionally unstable while solving a one dimensional wave equation? 1 point

- FTCS
 BTCS
 Lax Method
 Crank-Nicolson Method

No, the answer is incorrect.
Score: 0

Accepted Answers:
FTCS

2) The number of time levels required to solve a one dimensional hyperbolic equation using Leap Frog method is 0 points

- 1
 2
 3
 4

No, the answer is incorrect.
Score: 0

Accepted Answers:
3

3) What is the main disadvantage of explicit schemes in time dependent problems? 1 point

- Marching solution
 Simultaneous equation
 Small time step size
 Small grid size

No, the answer is incorrect.
Score: 0

Accepted Answers:
Small time step size

4) The Lax-Wendroff technique is 1 point

- explicit method
 implicit method
 two-step method
 none of the above

No, the answer is incorrect.
Score: 0

Accepted Answers:
explicit method

5) Which value is predicted in the predictor step of the MacCormack technique? 1 point

- variable at the current time step
 variable at the next time step
 time derivative of variable at the current time step
 time derivative of variable at the next time step

No, the answer is incorrect.
Score: 0

Accepted Answers:
variable at the next time step

6) The series expansion used in formulating the Lax-Wendroff method is 1 point

- Laurent series
 Maclaurin series
 Fourier series
 Taylor series

No, the answer is incorrect.
Score: 0

Accepted Answers:
Taylor series

7) The condition of stability for solving inviscid Burgers equation using Lax method is 1 point

- $\left| \frac{\Delta t}{\Delta x} u \right| \leq 1$
 $\left| \frac{\Delta t}{\Delta x} u_{max} \right| \leq 1$
 $\left| \frac{\Delta x}{\Delta t} u \right| \leq 1$
 $\left| \frac{\Delta x}{\Delta t} u_{max} \right| \leq 1$

No, the answer is incorrect.
Score: 0

Accepted Answers:
 $\left| \frac{\Delta t}{\Delta x} u_{max} \right| \leq 1$

8) In the Lax method we replace the term u_i^n with the averaged term $(u_{i+1}^n + u_i^n) / 2$. 1 point

- True
 False

No, the answer is incorrect.
Score: 0

Accepted Answers:
False