

Introduction to Week Six

Numerical Solutions of PDEs

Direct Solution of Boundary Value Problems

Iterative Solution of Boundary Value Problems

Time-stepping Methods for Initial Value Problems

- ✓

Video: Explicit Methods for Solving the Diffusion Equation | Lecture 69
13 min
- ✓

Reading: Using a Second-Order Time-Stepping Method
10 min
- ✓

Reading: FTCS Scheme for the Advection Equation
10 min
- ✓

Video: Von Neumann Stability Analysis of the FTCS Scheme | Lecture 70
14 min
- ✓

Reading: Von Neumann Stability Analysis of the FTCS Scheme for the Advection Equation
10 min
- ▶

Video: Implicit Methods for Solving the Diffusion Equation | Lecture 71
8 min
- ⌘

Reading: Implicit Discrete Advection Equation
10 min
- ▶

Video: Crank-Nicolson Method for the Diffusion Equation | Lecture 72
13 min
- ⌘

Reading: Lax Scheme for the Advection Equation
10 min
- ▶

Video: MATLAB Solution of the Diffusion Equation | Lecture 73
11 min
- ⌘

Reading: Difference Approximations for the Derivative at Boundary Points
1 min
- 🔗

Ungraded External Tool: The Diffusion Equation with No-Flux Boundary Conditions
30 min

Quiz

Programming Assignment: Two-dimensional Diffusion Equation

Farewell

Von Neumann Stability Analysis of the FTCS Scheme for the Advection Equation

Analyze the stability of the FTCS scheme for the advection equation, given by

$$u_j^{l+1} = u_j^l - \frac{c\Delta t}{2\Delta x} \left(u_{j+1}^l - u_{j-1}^l\right).$$

✓ Completed Go to next item

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