



AE/ME 339

Computational Fluid
Dynamics (CFD)

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Quiz 1



Test 1 topics

Modeling of fluid flow in a constant area pipe with heat addition and/or friction

Resulting ODE and its numerical solution

use of Taylor series to approximate functions and their derivatives

Numerical solution of initial value problems using R-K

Unsteady 1D heat conduction equation

Nature of the equation

Discretization of derivatives using Taylor series

Taylor series in more than one independent variable

An example of a non-linear PDE from fluid mechanics

Compact notation for CD approximation for 2nd derivative

Explicit method of solution

Problem setup

Initial and boundary conditions

von Neumann stability analysis for explicit and implicit schemes

Solution procedure for implicit method using Gauss elimination

Crank-Nicolson method. Stability of C-N

ADI method

Step-by-step implementation of ADI

Types of boundary conditions
Dirichlet, Neumann and mixed BC

Non-linear PDEs. Linearization techniques

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