Deptl. of Applied Mechanics

Major Examination

28.11.06

Applied Computational Methods (AML-702)

1. a) Give a typical speed-up model for a parallel process in terms of degree of parallelism for fraction of operation and time taken for single process.

b) As per Amdal's law show that speed-up is always less than "2" ignoring all communication and contention delays for "n" no. of processors.

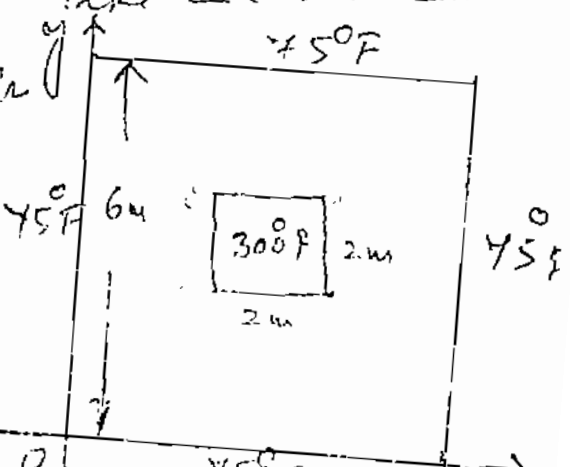
c) Outline performance study of a parallel system in terms of scalability, Granularity, speed-up efficiency.

2. Solve, for "y" at five time station, the given partial differential wave equation using central difference formulation use superscript for time and subscript for position, take $\frac{w}{\pi g}\left(\frac{\Delta t}{\Delta x}\right)^2 = 1$ for stability

$$\left(\frac{\partial^2 y}{\partial t^2}\right) = \frac{\pi g}{w}\left(\frac{\partial^2 y}{\partial x^2}\right)$$

show how other initial conditions are obtained if $y_{at\ t=0}$ is zero take $\Delta t = 0.2$

3. using the given finite difference grid give the complete formulation and algorithm to estimate the heat transfer through a plate with a hole as per given boundary conditions, $\frac{\partial^2 u}{\partial x^2} + \frac{\partial^2 u}{\partial y^2} = 0$



4. Solve the following set of coupled non-linear algebraic equations are using Jacobian Method.

$$5x^2 + 2xy - 25 = 0$$
$$-3x^2 + 4y^2 + 5y = 10$$

5. How the governing differential equations set of "n" equation are solved as per the following $[M]\{\ddot{x}\} + [k]\{x\} + [c]\{\dot{x}\} = \{F(t)\}$

a) validity of direct integration method.

b) Show the difference in explicit and implicit integration schemes with the help of expressions involved at discrete time stations.

c) How accuracy and stability are achieved?

6. Give algorithms for Galerkin and Ritz methods to solve ordinary and partial differential equations. How are these methods extended to finite element formulation.