APPLICATION FORM

Short term course on
Advanced Computing in Engineering and Sciences

Name:----------------------------------------------------------
Title/Position:-----------------------------------------------------
Organisation:------------------------------------------------------------
Mailing Address:----------------------------------------------------------

Email:----------------------------------------------------------
Fax:----------------------------------------------------------
Phone(s):----------------------------------------------------------
Areas of interest:

Accommodation Required: Yes / No

Details of enclosed Demand Draft:
No.---------------- Dated:------------------
Amount(Rs):----------------
Issuing Bank:----------------------------------------------------------
Date: Participant Signature

For further information contact

Course Coordinator:
Prof. Tapan K. Sengupta

Contact Address:
Prof. Tapan K. Sengupta
High Performance Computing Lab
Department of Aerospace Engineering
Indian Institute of Technology, Kanpur
Kanpur-208016

Phone : +91-(512)-2597945 / 2597253
Fax : +91-(512)-2597561
Email: tksen@iitk.ac.in,
tapansg@gmail.com
http://spectral.iitk.ac.in
http://home.iitk.ac.in/~tksen/

A Short Term QIP Sponsored
Course On
Advanced Computing in
Engineering and Sciences
(ACES)

Oct. 05-09, 2010

Venue :
IIT Kanpur, Kanpur

Organized by:

High Performance Computing Lab,
Dept. of Aerospace Engineering
Indian Institute of Technology, Kanpur

All learning begins when our comfortable ideas turn out to be inadequate.........
John Dewey
WORKSHOP OBJECTIVE

ACES course is designed to familiarize and provide hands-on exposure to fundamental principles and applied aspects of scientific computing in fluid mechanics, heat transfer, acoustics etc. Course is designed with combination of lectures from experts of HPCL, IIT Kanpur and numerical experiments as expository means.

Aim and Scope

Practical exposure on fundamental principles of computing related to DNS, LES, acoustics, flows with heat transfer.

Contents

1) Introduction to Advanced Computing.


3) Space-time discretization of PDE. Waves and disturbances in fluid flow, Hyperbolic and dispersive waves.

4) Space-Time Scales in Fluid Flow.

Signal and error propagation; Various spatial and temporal spectra in fluid flows; Space and time averages of NS equation; Spectral analysis of numerical methods; Error analysis of discretized differential equations; Classification of errors.

5) Methods for solving elliptical PDEs.

Point- and line-iterative methods; Alternating Direction Implicit (ADI) and Multi-grid methods; Newer methods of solving linear algebraic equations.

6) High accuracy computing methods.

Explicit versus implicit spatial discretization; General Padé or compact schemes; Evaluation and analysis of first and second derivatives by compact schemes; Error optimization and various compact schemes.

7) Temporal Discretization in computing.

Differences between spatial and temporal discretization; Physical and spurious modes in computing; Dispersion relation preservation (DRP) property; Analysis and design of DRP methods; Error control and optimization of discretization schemes.

8) Error control: Towards DNS.

Aliasing error and dealiasing; Dissipation discretization effectiveness and combined compact difference schemes; Filtering tool for instability control.

9) Numerical filters: In Large Eddy Simulations (LES) and Detached Eddy Simulations (DES).

10) Curvilinear co-ordinate systems and Chimera methods.

Generalized coordinate transformation, Grid generation methods; TLNS and PNS equations; Chimera grid and role of interpolation error.

11) Finite volume method.

Finite volume discretization; High resolution flux vector splitting, finite volume, upwind methods: QUICK and MUSCL schemes and compact based methods.

12) Solutions of Navier-Stokes equation:

Methods using primitive variables; Staggered formulation using compact schemes; High accuracy methods using streamfunction-vorticity formulation; Velocity-vorticity formulation; Receptivity and instability for incompressible and compressible flows.

APPLICATION PROCEDURE

Application in the attached form should be sent to the coordinator with a caution deposit of Rs. 200/ with a D.D. in favour of “Continuing Education Programme, IIT Kanpur”. This will be refunded for all participants. QIP participants will be paid TA/DA for A/C three tier for attending the course. DA will be paid as per rules, adjusted against boarding and lodging at IIT Kanpur.

Non-QIP participants can join by paying the following fees by D.D. in favour of “Coordinator, ACES” by 20th September, 2010. Accommodation will be arranged in IIT Kanpur.

PARTICIPANTS FROM 
FEES

1) Industry and R&D organizations Rs. 20,000/-
2) Academic Institutes (Non-QIP candidates) Rs. 10,000/-

Acceptance to the course will be decided by the coordinator upon viewing the application form. Please send your email / mobile no. for communication.