



Training Course on AVBP 6.1 CFD code of CERFACS

Dates:

January 18th-21th, 2009

Venue:

CERFACS, Toulouse

Scope:

This training course will allow participants to understand the underlying basics of Large Eddy Simulation (LES) and to manipulate the AVBP CFD code (version 6.1) of CERFACS for different simple representative computational problems of LES for reacting compressible flows. The course is organised in the frame of the FP6 EU projects AETHER, ECCOMET (both Marie Curie networks) and TLC, and FP7 EU projects LIMOUSINE, MYPLANET (both Marie Curie networks). It is addressed to both engineers and scientists.

Programme:

Day 1: Introduction

9h45: LES of reacting compressible flows – Introduction. The differences between RANS and LES. The codes for LES.

10h45: How does AVBP work: files – scripts – general organization.

11h30: Installation on computers, accounts, computer organization.

14h00: Hands-on (work on computers): An example of LES post processing: the PRECCINSTA project experiment (reacting case). Run temporal post-processing, snapshots (Paraview), unsteady diagnostics, etc. The link with input files.

Day 2: Periodic flows

9h00: Dissipation and dispersion of waves. Introduction using a simple second-order scheme. Presentation of results for AVBP schemes (LW & TTGC). What is needed for LES?

9h30: Implementation of numerical schemes in AVBP.

10h30: Hands-on: measurement of dispersion and dissipation on acoustic wave propagation.

14h00: Hands-on: simulation of two-dimensional vortices. Effects of mesh and of scheme.

Day 3: Boundary conditions

9h00: Boundary conditions in compressible flows: characteristic methods.

9h45: Implementations of boundary conditions in AVBP.

10h30: Hands-on: simulation of 1D acoustic waves reaching non-reflecting and reflecting boundaries. Generation of propagating acoustic waves.

14h00: Hands-on: simulation of 1D entropic waves reaching non-reflecting and reflecting boundary conditions. Simulation of two-dimensional vortices reaching boundaries. Acoustic modes in cavities: Effects of boundary conditions and of mesh.

Day 4: Laminar flames

9h00: LES of reacting flows: thermodynamics, kinetics, laminar flames and turbulent combustion model.

10h30: Hands-on: simulation of a one-dimensional laminar flame (initial flame file (COSILAB) is provided) with and without flame thickening.

12h30-14h: LUNCH (Salle d'hôtes).

14h00: Hands-on: simulation of a forced two-dimensional laminar flame.

