HLRS-Parallel Programming Workshop

by

— DLR e.V. Institute of Software Methods for Product Virtualization (SP)

— High Performance Computing Center Stuttgart (HLRS),
University of Stuttgart

in cooperation with:

— Institute for Aero- and Gas-Dynamics (IAG),
University of Stuttgart

— Institute of Fluid Mechanics and Hydraulic Machinery (IHS),
University of Stuttgart

— Institute of Fluid Mechanics (ISM),
University Dresden

Introduction to CFD — 1st day (Monday)

Introduction, basic equations, cluster usage and visualization

09:30	CFD – An overview	[HPCFD01]
11:00	Coffee	
11:30	Fundamentals of fluid dynamics	[HPCFD02]
13:00	Lunch	
14:00	Exercise: Working on the cluster, Using Ateles	[HPCFDx1+x2]
15:00	Coffee	
15:30	Numerics of Partial Differential Equations	[HPCFD03]
17:30	End	

Introduction to CFD — 2nd day (Tuesday)

Finite Volume Method

09:00	Finite Volume Methods	[HPCFD03]
10:45	Coffee	
11:15	Higher Order Methods	[HPCFD06]
13:00	Lunch	
14:00	Exercise: Riemann problem and flux functions	[HPCFDx2+x3]
15:00	Coffee	
15:30	Exercise: Post-processing (Harvester)	[HPCFDx4]
17:30	End	

Introduction to CFD — 3rd day (Wednesday)

Finite Element Method, incompressible flows

09:00	Finite Element Method	[HPCFD05-FEM]
10:45	Coffee	
11:15	Incompressible Flows	[HPCFD05-Incompressible]
13:00	Lunch	
14:00	DG in Ateles	[HPCFDX7]
15:00	Coffee	
	Addendum: Mesh Generation	[HPCFDX5+6]
15:30	Generating Meshes with Seeder and Simulations with varying order	[HPCFDX7]
17:30	End	

Introduction to CFD — 4th day (Thursday)

Turbulence and Lattice Boltzmann

09:00	Turbulence	[HPCFD07]
10:45	Coffee	
11:15	Lattice Boltzmann	[HPCFD11]
13:00	Lunch	
14:00	Exercise: Musubi for LBM	[LBM Exercise]
15:00	Coffee	
15:30	Exercise: Subsonic Jet	[HPCFDx8]
17:30	End	

Introduction to CFD — 5th day (Friday)

Parallelization, Performance

09:00	Parallelization part I	[HPCFD08]
10:45	Coffee	
11:15	Parallelization part II	[HPCFD09]
12:00	I/O	[HPCFD10]
13:00	Lunch	
14:00	Performance	[HPCFDx9]
16:00	End	

Appendix