10th Symposium on Overset Composite Grids and Solution Technology
Tutorial Sessions on Monday, Sept. 20, 2010

Session: OVERFLOW 2.2 Training Class

Instructors: Bobby Nichols (University of Alabama) and Pieter Buning (NASA Langley Research Center)

Synopsis: The objective of this class is to provide the CFD practitioner with a working knowledge of the models and methods available in the latest release of the OVERFLOW 2 overset structured grid Navier-Stokes code. Both the flow solver and the moving grid capabilities contained in OVERFLOW 2 will be discussed. Emphasis will be placed on the "best practices" for use with each of the areas discussed. Recent upgrades to the software will also be covered. The OVERFLOW 2 software is available to the U. S. government and industry and is distributed by NASA.

Total class time will be 6 hours divided into morning and afternoon sessions. The morning session will cover OVERFLOW capabilities, CFD nomenclature and equations, basic running of OVERFLOW, and namelist input parameters. Also covered will be inviscid flux options, implicit solvers, boundary conditions, species equations, turbulence models, and unsteady flow outputs. The afternoon session will cover running OVERFLOW with and without body motion, including near-body/off-body grid generation, using DCF for cutting holes, XML files for specifying body motion, time-steps and subiterations, and output for moving body problems. Off-body grid adaption will also be discussed.

Session: Adding an Overset Capability to a Flow Solver using DiRTlib and libSuggar

I**nstructor:** Ralph Noack (The Pennsylvannia State University)

Synopsis: This presentation will provide an introduction to using DiRTlib and libSuggar to add an overset capability to a flow solver. The general capabilities of each library will be briefly discussed and followed by a discussion of the library functions and how to use them. The presentation will start with a simple case of using only DiRTlib for serial execution and incrementally add new capabilities that are typically required by a flow solver until a reasonably complex configuration with parallel execution is presented. A test code that is representative of the calls required by a flow solver will be used to demonstrate the library usage. This will be a presentation only and not a hands-on lab.

Session: Pegasus 5: An Automated Pre-Processor for Overset-Grid CFD

Instructor: Stuart Rogers (NASA Ames Research Center)

Synopsis: This 90 minute tutorial will provide an overview of the Pegasus5 software suitable for both novice and experienced users. The goal of the course will be to provide users with enough knowledge about the software that they may use it successfully for very complex

systems of overset grids. The first part of the course will discuss the features of the software, and how these features attempt to automate
the oversetting process. These include the automatic hole cutting, the interpolation process and the optimization of the overlap between grids, the automatic projection of overlapping surfaces, the restarting capability of the code, and the parallel-processing ability of the software. The second part of the course will provide an overview of the usage of the software. This will include a description of the required input files, the expected output files, and what the user should look for when they run the software. The class will conclude with advice on overcoming problems when they arise, and illustration of several examples.

Session: An Overture Tutorial

Instructors: Jeff Banks, Kyle Chand, and Bill Henshaw (Lawrence Livermore National Laboratory)

Synopsis: The Overture tutorial will give a introduction to constructing grids and solving partial differential equations using Overture. The tutorial will cover (1) solving an advection-diffusion equation using the high-level C++ interface (one of the Overture primer examples), (2) creating mappings (component grids) with Overture geometry tools and constructing overlapping grids with ogen, (3) solving incompressible flows with cgins (including moving grids) and (4) solving compressible flows with cgcns (including the use of adaptive mesh refinement).

Session: A Chimera Grid Tools Tutorial

Instructors: William Chan and Shishir Pandya (NASA Ames Research Center)

Synopsis: A brief overview of recent developments in Chimera Grid Tools will be given. Highlights will include changes in the installation scripts, and updates to various individual tools. New features in OVERGRID will be shown in a demo which includes CAD part import using CAPRI and VTE libraries, interpolation stencil viewing, and flow solution visualization for 2-D adaptive moving body cases. Grid generation script creation using the CGT script library will be demonstrated on a rocket geometry. The script will cover generation of surface and volume grids, X-ray maps, hole cut instructions, flow solver boundary conditions, and force/moment computation inputs. A short demo will also be given on the new line loads computation tool TRILOAD.