Backstep Example

Baclward facing step. Steady 2-d turbulent flow using the MARVS Reynolds stress model. Conditions correspond to the data of Kasagi et al. (1993). Calculation as in Moore and Moore (2009) slide 2.8, but using code M4D, a coarser grid and the MARVS model.

Unix instructions to run the backstep example

(1) Set up the fully developed flow inlet conditions. Bring up a terminal window and cd to chan2d.fdf.example, then

```
mkdir out
../../a.m4d < in.marvsRd9550 > out/print
mv out out.Rd9550
```

(2) Using the results from (1) set up an initial estimate of the flow properties for the backstep. cd to backstep.example, then

```
mkdir out
../../a.m4d < in.varinit0 > out/print
mv out out0
```

(3) Run the calculation

in directory chan2d.fdf.example run the following to set up fdf inlet

```
mkdir out
../../a.m4d < in.backstep > out/print
```

Input/Output

(1) see doc.rtf in dir chan2d.fdf.example

(2) The primary input file, in.varinit0, uses as input the calculation grid, geom.108.36, and the results from (1), ../chan2d.fdf.example/out.Rd9550/varinit, ../chan2d.fdf.example/out.Rd9550/dpdx, and gives out/varinit, out/dpdx, and out/U1init.gif.

(3) The primary input file, in.backstep, uses several other input files for specific tasks.

inn.grid108x36 - set up calculation grid, geom.108.36, block pressure solution, and other grid related initializations.

inn.init.from.out0 - initialize variables using results of (2). Set outflow boundary condition.

inn.iter.uvwpmarvs * - one iteration of the steady flow procedure to solve momentum, continuity and the MARVS model. Uses:

inn.newcv * - to reset the control volumes and related arrays.
inn.iter.marvs * - 1 iteration to update Reynolds stress variables.
inn.cont * - additional velocity updates from continuity.
inn.analysis10.50 * - to analyze changes over 10 and 50 iterations.
inn.iter.output - to dump results to out/u#ITER and plot using:
inn.plotconv * - convergence plots, out/conv.gif and out/convm.gif .
inn.plotq - qturb, out/qdUmax#ITER,gif and color bar, out/qbar.gif.

Input files inn.iter.uvwpmarvs, inn.cont, inn.analysis10.50, inn.iter.output all contribute to the convergence file out/converge started in in.backstep.

* Identical to the files in turbine2d.example. For standard 2d or 3d steady MARVS calculations with fixed inlet conditions.

Compare results with those obtained by jgm.

Post-processing of output by jgm

Delete out/u100 thru out/u400. Move dirs. out0 and out to dir. out.jgm.