InstantWind Project

I) Project setup - file system/directory structure for running the project.

1) Create a main project directory - we named it ***InstantWind***.

2) Within that directory create two directories

a) ***VBShearFlow*** - which will contain the data from the CFD computations.

b) ***ModelReductionDemo*** - which will contain script files and output figures.

3) In the ***InstantWind/VBShearFlow*** directory, each CFD case (assume at total of 7) will have the data in directory - dat_files_1, dat_files_2, ..., dat_files_7.

4) For this demo, *download the CFD data* (hyperlink) from the instantwind webpage to the directory ***InstantWind/VBShearFlow***.

5) In the ***InstantWind/VBShearFlow*** directory, also *create a directory* named '***bin***', which shall contain the files (.mat format like basisCollection, snapshotsCollection, etc - described later) created during the program run.

6) From the instantwind webpage, *download the zip file* (hyperlink) (for the matlab and c files), and save it in the folder ***InstantWind/ModelReductionDemo***.

7) *Unzip* the files in the directory ***InstantWind/ModelReductionDemo***.

8) Create a directory called '***figures***' in the directory ***InstantWind/ModelReductionDemo***. Here we shall save the resulting output figures of the algorithm.

II) We now describe how to run the project.

(It is suggested that the user goes through the theory section of the project report (hyperlink) to get an understanding of the tasks involved. Some of the keywords like 'snapshots', 'basis' are described in the report. A brief sequence of tasks in the algorithm is described in point 6 below.)

1) Start matlab and change current directory to ***InstantWind/ModelReductionDemo***.

2) We need to create mex files for using c functions (for RANS operators) in matlab. At the command prompt type the following:

```
>> mex A_mex_check2.c

>> mex V_mex_check2.c

>> mex P_mex_check3.c

>> mex K_mex_check3.c
```

3) At the matlab command prompt type 'modelReductionDemo' and press the 'return' key.

>> modelReductionDemo

4) Clearly, the main script (or function) for the project is *modelReductionDemo.m* and the description of variables is described in it.

5) When the user is asked for an input to the keyboard, please type in (and not copy paste)

>> `makeSnapshotsCollecionOpenFoamXY(snapshotCollectionFileName, CFD_ResultsPathH, CFD_ResultsPathV, CFD_JobsStruct, flagSB);`

6) The code goes through the following main functions

a) `makeSnapshotsCollecionOpenFoamXY – Collects the CFD results (snapshots).`

`b) readFrontTileOpenFoam – Collects information of the frontTile, to be used as a constraint (rhs of equations Ax=b) for the solution.`

`c) makeBasisCollectionOpenFoam – Performs SVD on the snapshots (from the snapshotlist.)`

`d) RANSEquationsOperators2 – Computers the operators (Advection, Viscous, Pressure, Turbulent Kinetic Energy) for the RANS equations.`

`e) modelReductionSolverOpenFoamXY – computes the reduced solutions based on the information from the above functions.`