Operation guide for ransX analysis framework based on RANS equations
(https://arxiv.org/abs/1401.5176) implemented by PROMPI

Date	Version	Person	Change
5/January/2019	1.0	Miroslav Mocak	Initial instructions

Prerequisite:

- Linux/Windows operating system
- Python 2.7 + ipython

1. Go to https://github.com/mmicromegas/ransX

2. Download the whole repository e.g. using "git clone https://github.com/mmicromegas/ransX"

3. Structure and description of the repository is the following

    ransX\EQUATIONS - contains classes each dedicated to a specific RANS equation
    ransX\PARAMS - contains parameter files for specific simulations
    ransX\RESULTS – contains result plots stored in png format
    ransX\TSERIES – space-time averaged data from ransX_tseries.py
    ransX\CALCULUS.py – class with required calculus methods (grad, div)
    ransX\MasterPlot.py – class for plotting of the RANS equations
    ransX\PROMPI_data.py – class for data read from PROMPI
    ransX\ReadParams.py – parser class for reading of parameter file param.file
    ransX\operationGuide1.0.docx – operation guide
    ransX\param.file – parameter file controlling output plots
    ransX\ransX.py – main script
    ransX\ransXtoPROMPI.pdf – mapping of the RANS equation to PROMPI terms
    ransX\ransX_tseries.py – script calculates averages for a given time range and window

4. Copy *.ransdat and *.ranshead data from your simulation to a dedicated folder, open ransX_tseries.py, change the address of the rans data folder on line 8 in datadir, on line 9 specify its output name in dataout and in trange and tavg specify the time-range and averaging window

5. Run ipython and execute "run ransX_tseries.py"

6. Copy the dataout file to ransX\TSERIES folder

7. Open param.file and change all the parameters as needed, change only values highlighted in yellow below. Most of them are self-explanatory. Do not change other values, they serve as identifiers for ReadParam.py parser class. There is currently no validation implemented for the param.file so if you enter invalid values you may get some random error. To plot or not to plot given equation is controlled by the boolean values True and False.

- parameter "Central Time Index" requires knowledge about final number of time-averaged sets based on time range and averaging window

- parameter "Limit Axis" can have values 0, 1 and 2.
  : Value 0 means no limitation, where x and y axis will be limited by maximal values.
  : Value 1 will limit x axis based on 3rd and 4th parameter of the equation parameters, y axis will be limited by min/max values within the limited x axis.
  : Value 2 will limit x axis based on 3rd and 4th parameter of the equation parameters and y axis based on 5th and 6th parameter value.

Input Data .... ## [prop,eht_data,TSERIES/tseries_ransout_oblrez.npy]

Filename Prefix For Plots .... ## [prop,prefix,oblrez_]

Geomergy; ig = 1 Cartesian, ig = 2 Spherical ... ## [prop,ig,2]

Central Time Index .... ## [prop,intc,7]

Limit Axis .... ## [prop,laxis,1]

X-axis Left boundary for properties .... ## [prop,xbl,4.e8]

X-axis Right boundary for properties .... ## [prop,xbr,9.8e8]

Nuclear network ....## [network,neut,prot,he4,c12,o16]

[]

Continuity Equation .... ## [conteq,True,3.7e8,9.8e8,5.e2,-5.e2,0]

Continuity Equation Bars .... ## [conteqBar,False,3.7e8,9.8e8,1.5e29,-1.5e29]

Density Stratification .... ## [rho,False,3.7e8,9.8e8,1.,-1.,0]

Turbulent Kinetic Energy Equation .... ## [tkeeq,True,3.7e8,9.8e8,5.e18,-5.e18,0]

8. Run ipython and execute "run ransX.py"

Operation Hints:

If your plot makes only little sense, with large values at convection boundaries, zoom into the convection zone region using python's "Zoom to rectangle" feature – red rectangle below. Click on it and select region to zoom in until you get reasonable scale and expected balance in the RANS equation.