

## Operation guide for plotting of RANS X transport, flux and variance equations based on ransdat data from PROMPI

Date	Version	Person	Change
25/March/2018	1.0	Miroslav Mocak	Initial instructions for plotting of ransX equations (code still needs to be tested with proper turbulence data)

### Prerequisite:

- Linux operating system
- Python 2.7 + ipython

1. Go to [https://github.com/mmicromegas/PROMPI\\_DATA](https://github.com/mmicromegas/PROMPI_DATA)
2. To a dedicated directory <DIR> download the following files (or download the whole repo but some classes and still not finished):
  - PROMPI\_RANS\_xnu.py (class for plotting of the ransX equations)
  - PROMPI\_data.py (class for reading ransdat data)
  - CALCULUS.py (class with useful calculus methods)
  - plot\_rans\_xnu.py (control script for plotting)
  - rans\_tseries.py (script for calculating of time-averaged fields from ransdat)
3. In <DIR> create two sub-directories DATA and RESULTS
4. Copy your \*.ransdat and \*.ranshead data to folder DATA
5. Open rans\_tseries.py and adjust the following parameters:
  - trange (line 9). Restrict time-range of your ransdat data in DATA folder for time-averaging.
  - tavg (line 10). Set time-averaging window (at least 2 convection turnover timescales)
6. From <DIR>, start ipython and execute > run rans\_tseries.py
7. After successful completion of rans\_tseries.py, the time-averaged data are stored in a file called tseries\_ransdat.npy. Check if the file was in the <DIR> created successfully.
8. Open plot\_rans\_xnu.py and adjust the following parameters:
  - intc (line 13). Choose index of central time for which you wish to plot the ransX fields.

- inuc (line 16). Choose ID of the element for which you want to plot the ransX fields. It has to have the format 00xx , for example 0001 is neutrons, 0002 is protons, 0003 is he4, 0004 could be c12 (all depends on your network)
- LGRID (line 20). Choose whether you want to limit your x-grid. Good if you want to get rid of boundary noise (1-true, 0-false)
- xbl, xbr (lines 23-24). Set left/right radius for which you want to limit x-grid in your plots. Y-axis will adjust itself automatically.
- lc (line 27). Optional. Estimated size of convection zone. This is still work in progress. Set it properly, if you want to get Eulerian diffusivities right.

9. From <DIR>, start ipython and execute `> run plot_rans_xnu.py`

10. Wait for the plots to be displayed.

11. If you wish to display also radial profiles of element density, flux and variance, uncomment lines 34, 39 and 44 i.e. `#RANSX.plot_Xrho(xbl,xbr,inuc,data_prefix),`  
`#RANSX.plot_Xflux(xbl,xbr,inuc,data_prefix), #RANSX.plot_Xvariance(xbl,xbr,inuc,data_prefix)`

12. If you want to display various diffusivities for the target element, uncomment line 49,  
`#RANSX.plot_X_Ediffusivity(xbl,xbr,inuc,data_prefix)`