ADAS Files:
acd96_ne.dat
scd96_ne.dat
ccd96_ne.dat

python files

adas_read_ne.py	reads ADAS data
func_ne.py	reads the profiles (including modeled D and v from Ne37062t0.000_2.000_5 and calculates the radial profiles of ionization and recombination rates.
ne_analytical1.py	Main. Calls func_ne.py internally and calculates the profiles of neon ions.

Other files

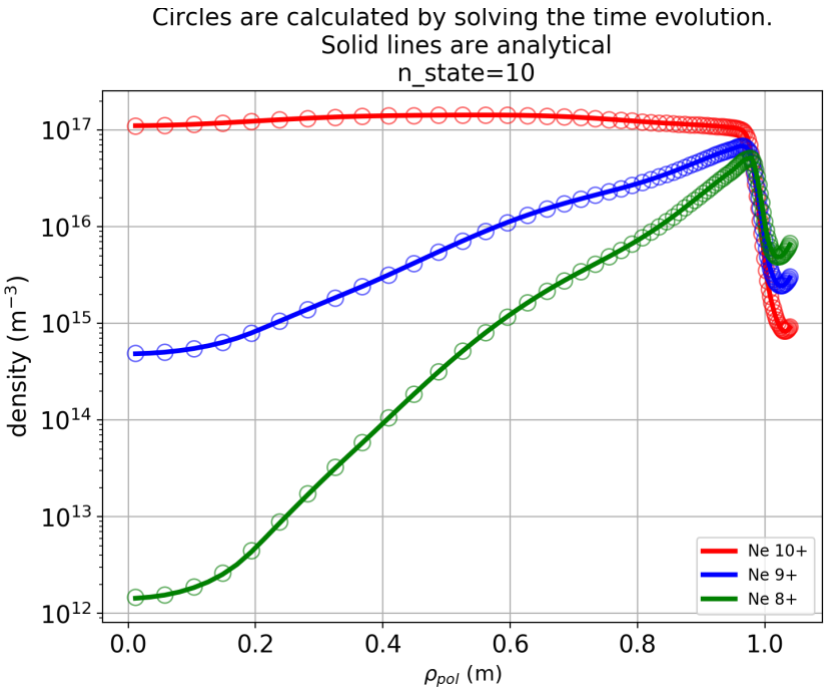
Ne37062t0.000_2.000_5	profiles for AUG shot 37062 (see R. Dux, et.al., Nucl fusion 2020)
Ne_with_flow.ncdf	ne profiles calculated by solving the time evolution. This can be compared with the results from ne_analytical1.py

```
In [1]: import ne_analytical1
```

```
In [2]: F=ne_analytical1.Matrix_ne(n_state=None,  M = 0.1, L_para=25.0, edge_given=1)
```

```
In [3]: ne_analytical1.plot_comp(F, nz=3)
```

This command gives



The circles are the solution stored in Ne_with_flow.ncdf, which is calculated by solving the time evolution. The solid lines are the analytical solution.

In [2]: F=ne_analytical1.Matrix_ne(n_state=None, M = 0.1, L_para=25.0, edge_given=1)

The argument “n_state” specificies the number of charge states that are taken into account. Neon has 10 charge states. (We neglect neutrals) If n_state=7, then, Ne^1+, Ne^2+ and Ne^3 will be excluded from the simultaneous equation. This does affect the profiles in the SOL. But not so much in the confined region. Neglecting the lower charge state helps reduce the computation cost if it’s acceptable.

In [3]: ne_analytical1.plot_comp(F, nz=3)

Please try different “n_state” when defining F, and replot by using the command above. nz=3 specifies how many charge states will be plotted. nz=3 means Ne^10+, Ne^9+ and Ne^8+. More charge states can be seen by increasing “nz”.