

ATEN with JBS (sfincs)

Simple 2-pass “self-consistent” loop

J.C. Schmitt, A. Bader

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Step 1: Convert to 2.5 Tesla

- Done
- See draco for output file.
- ATEN/V0_localrun
- Phiedge ~ 0.5984 for $B_0 = 2.5$ T

Profiles of Te, Ne, Ti, Ni

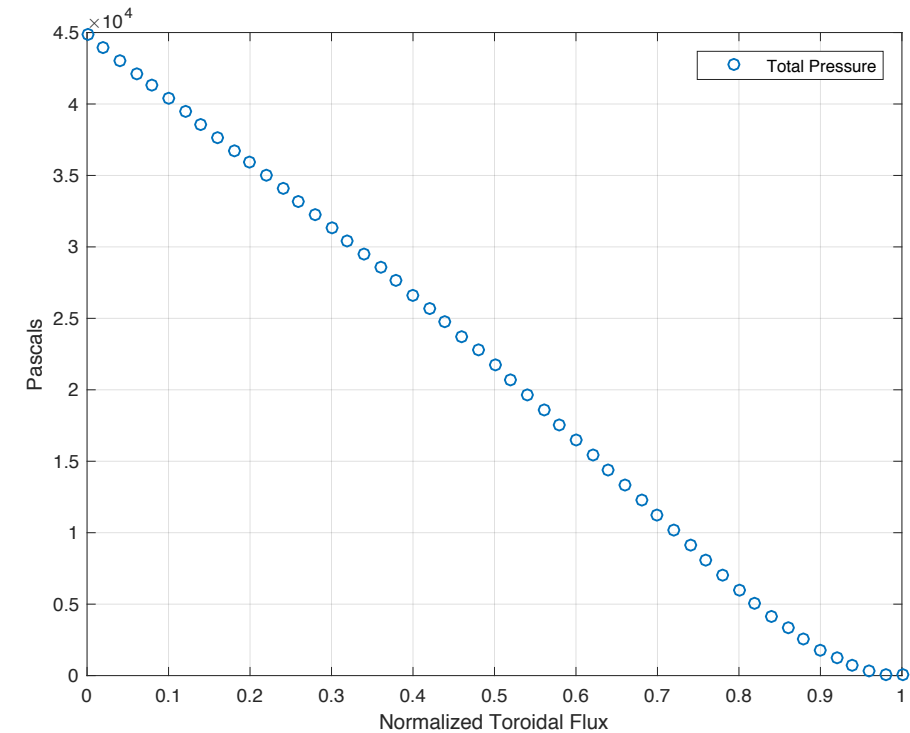
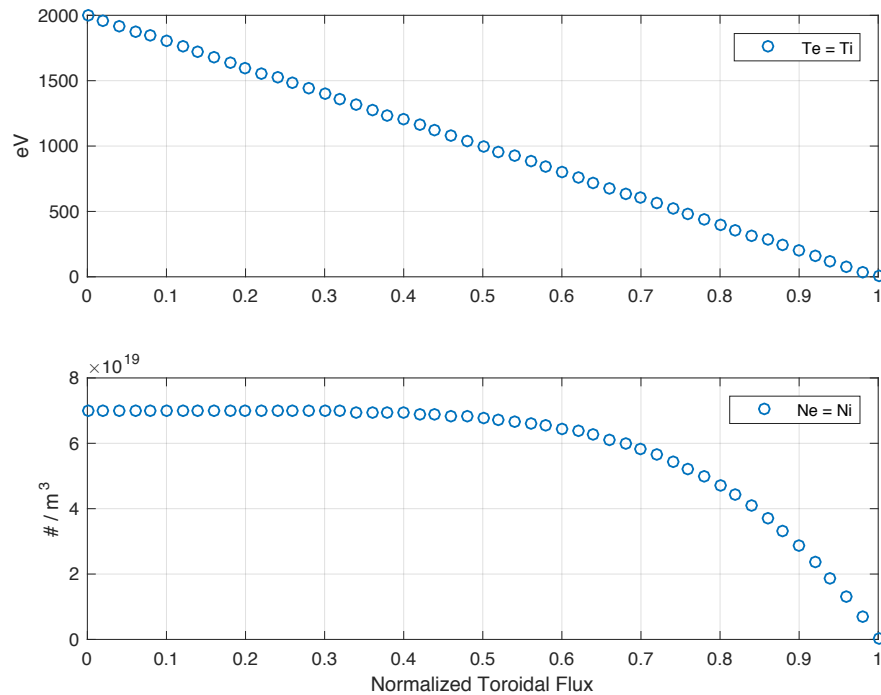
The call came in from HQ

- Density:
 - $LA \sim 5 \times 10^{19}$
 - Peak $\sim 10^{20}$
 - Xmode 2.5T, 40 GHz $< 1.2 \times 10^{20}$
- Temp
 - Ti $\sim$ Te $\sim$ 1 keV 'average'
- Beta
 - $\sim 1.5\%$

We decoded the message

- Density:
 - $7 \times 10^{19} * (1 - s^5) \text{ \#/m}^3$
 - 's' is normalized toroidal flux
- Temperature
 - $2.0 * (1 - s) \text{ keV}$
- Pressure
 - Ne = Ni
 - Te = Ti
 - $q \sim 1.6 \times 10^{-19}$
 - $P = Ne * Te * q + Ni + Ti * q = 2 * 7 * 2 * 1.6 * 10^{(19+3-19)} * (1-s)(1-s^5)$
 $= 44.8 \times 10^3 * (1-s)(1-s^5)$
 $= \text{Pres_scale} = 44.8 \times 10^3, \text{ AM} = 1 - 1 \ 0 \ 0 \ 0 - 1 \ 1$
- Beta
 - Total: 0.83%
 - Peak: 1.77%

Input profiles of T_e , N_e and P_{total}



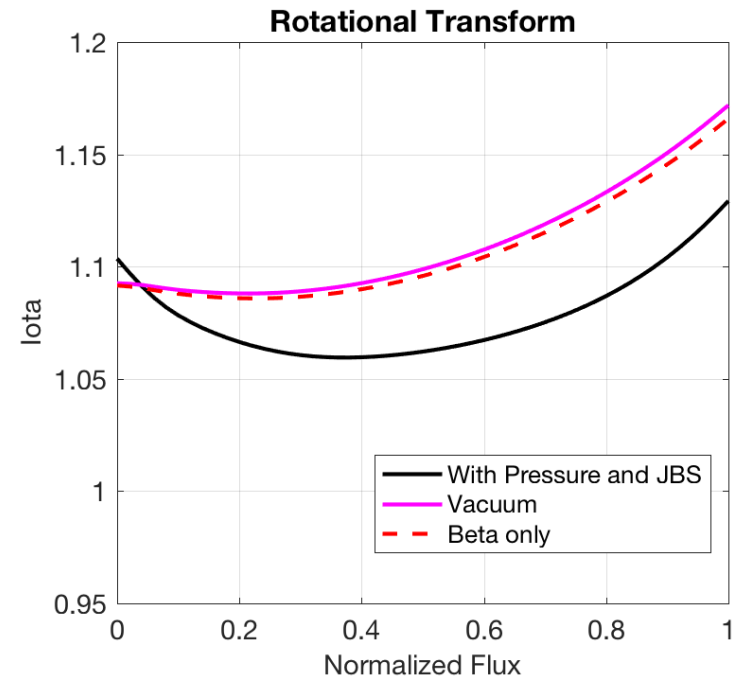
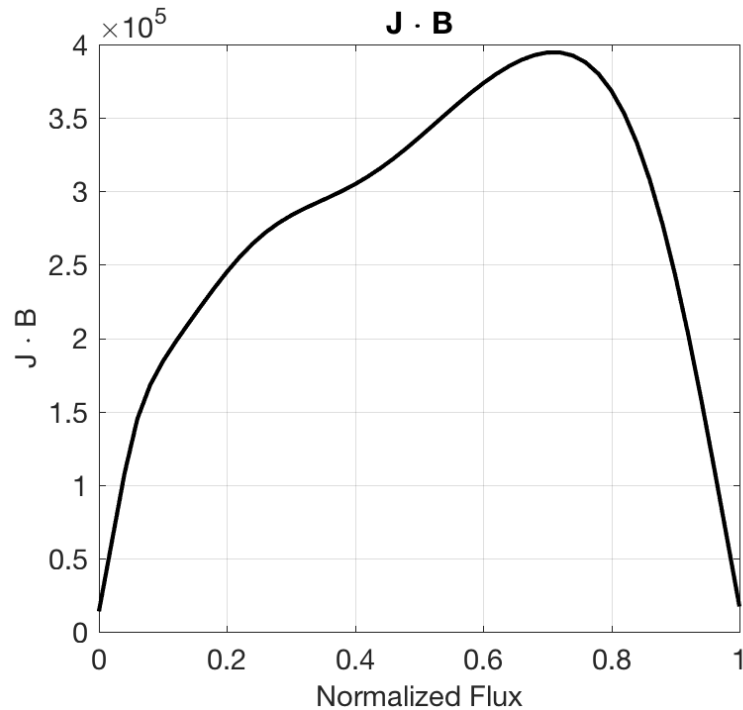
Set up SFINCS (General plan, adjusted as necc)

- Radial scan in normalized flux: $s = 0.05, 0.10, \dots, 0.95$
- Er scan from $E_r = -20.0, -19.0, \dots, 10$
 - Additional scans as necessary to ascertain e-/i- root effects
- Sometimes $s=0.05$ is dropped
- Sometimes $s=0.96, 0.97, 0.98$, and 0.99 are added
- Convergence test performed (albeit afterwards)

Convergence tests

- Finished. Things look okay
- Look in: **/u/jsch/sfincs_runs/ATEN/CONVERGE** on **DRACO**
- Results build upon prior convergence calculations and experience with SFINCS/QH configs
 - In the ion-root regime, convergence is easily achieved with QH configurations.
 - Additional roots seen at extremely high magnitudes of E_r (e-root, unstable, + more)

Final result for JBS profile for ATEN



```
PCURR_TYPE = 'power_series'
```

```
CURTOR = 25979.3159522
```

```
AC = 6.91674709e+02  4.80312895e+05 -6.45496546e+06  5.33832672e+07  
      -2.61874839e+08  7.93020716e+08 -1.52366598e+09  1.86296056e+09  
      -1.40452137e+09  5.94809853e+08 -1.08138830e+08
```