27.01.2009

Benchmark comparison ASTRA – JETTO

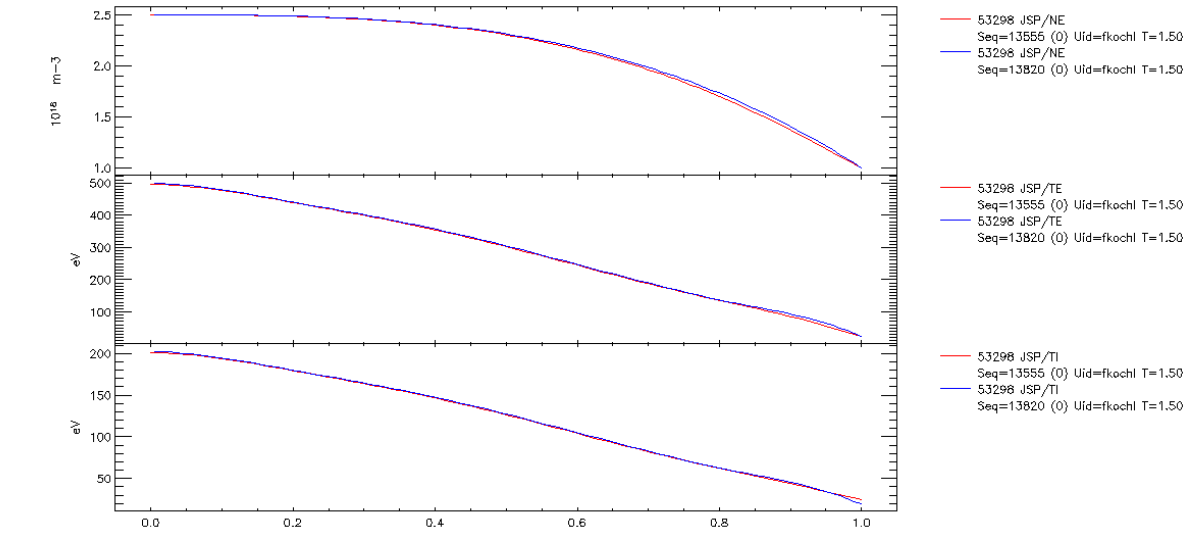
ASTRA curves in red, JETTO curves in blue

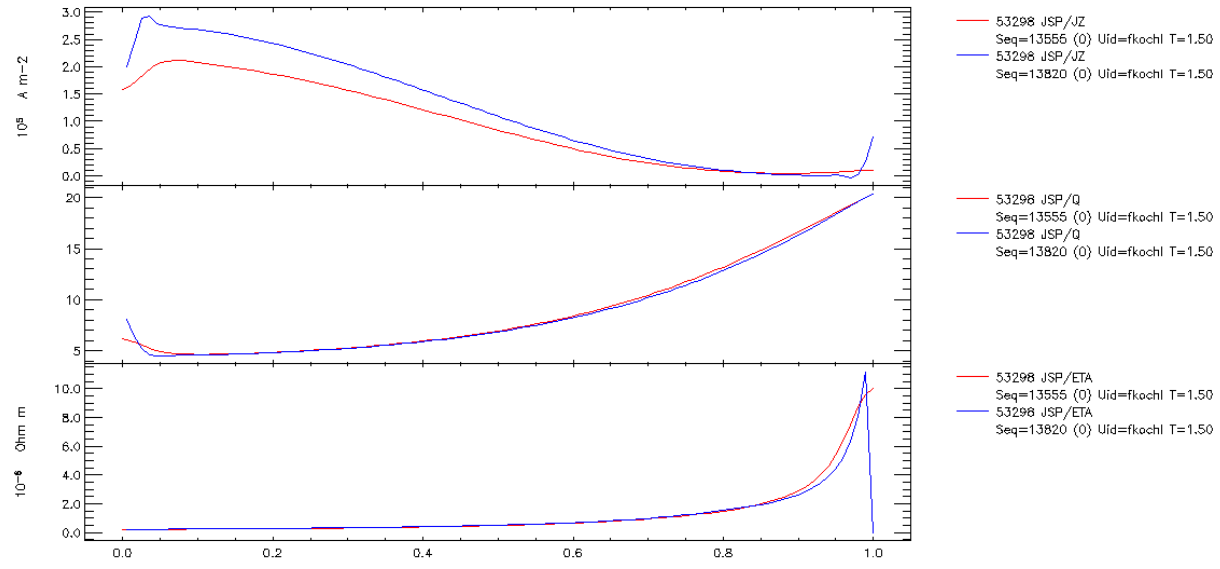
Case 1 :

- All data are frozen at t=1.5 s.
- The only evolving quantity is j(rho,t).
- Bootstrap current is set to zero.

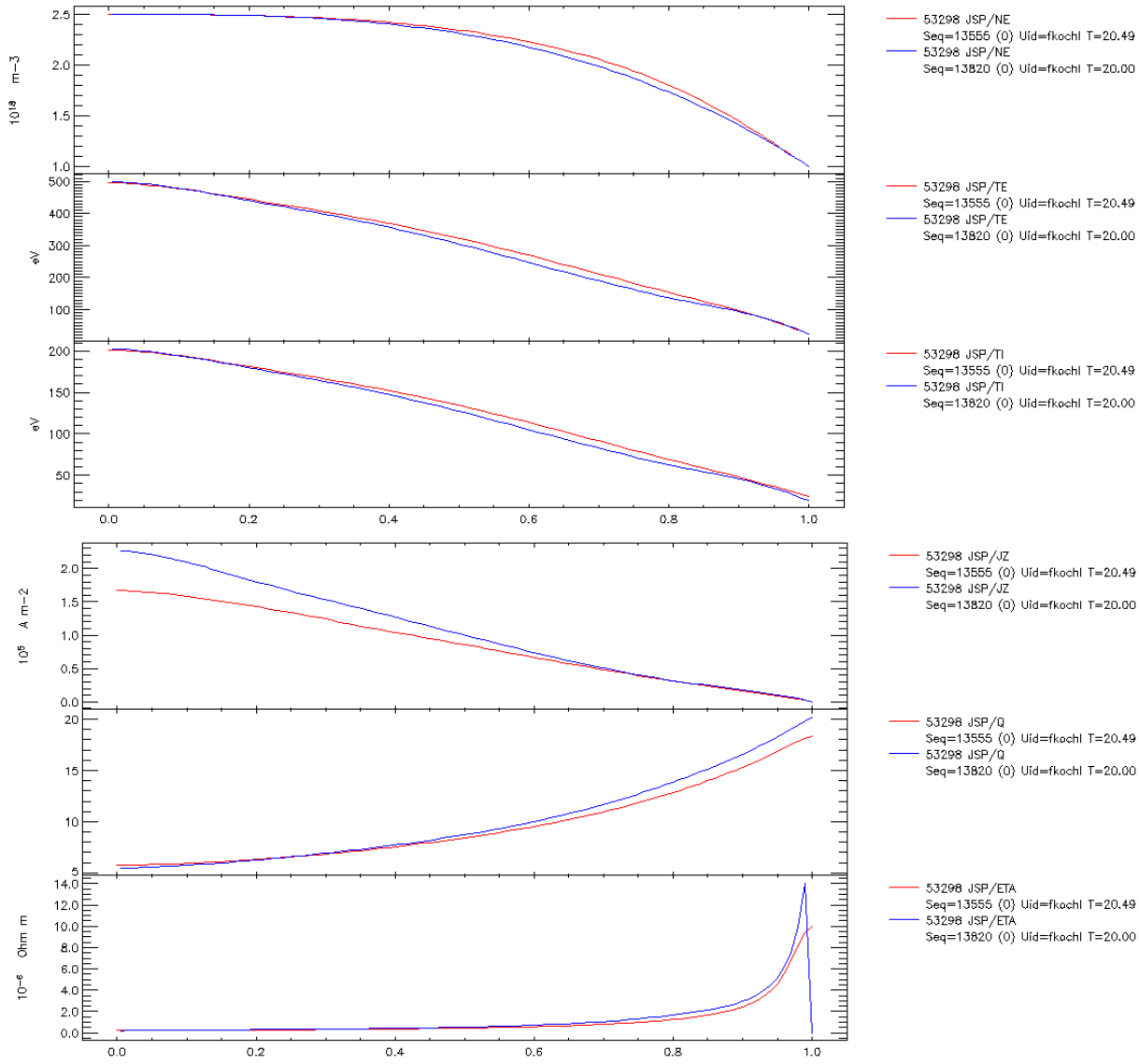
ASTRA run:
MDS+: gperev seq#8, shotid 54699
ppf: fkochl/ppfseq.13555
JETTO run:
fkochl/jan2709/seq.1/ppfseq.13820

<u>Profiles at t = 1.5s:</u>





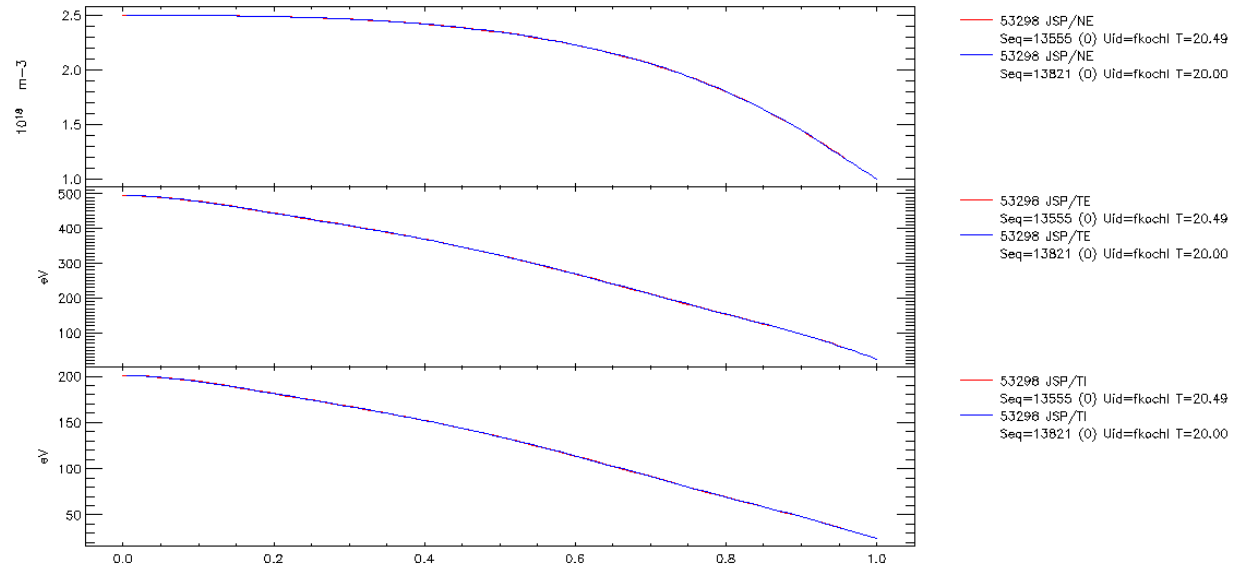
Profiles at t = 20s:

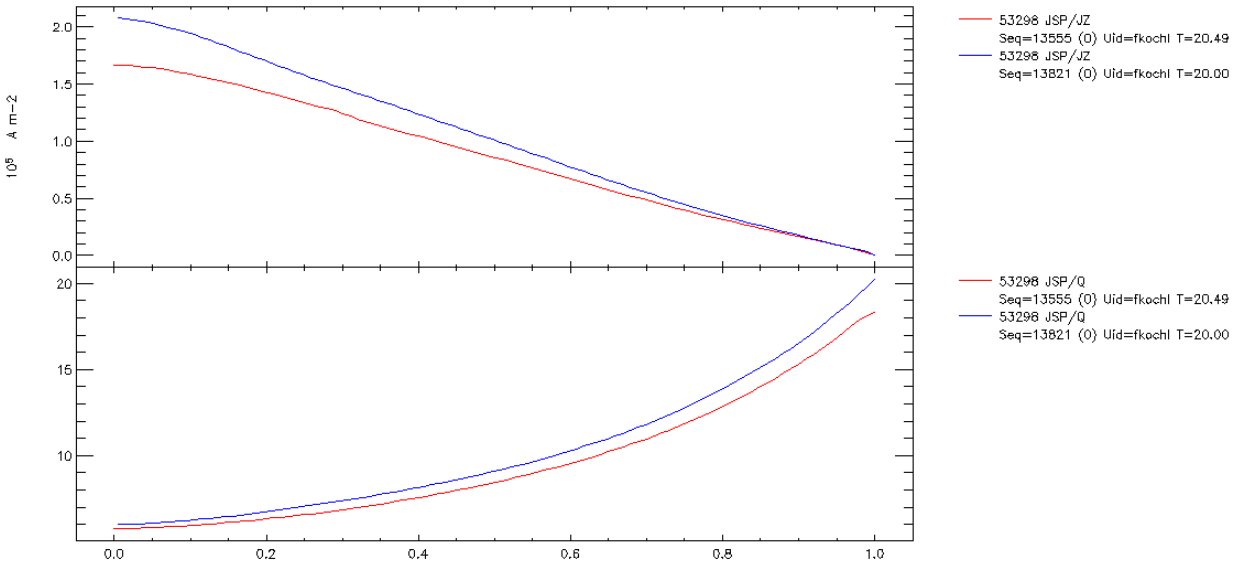


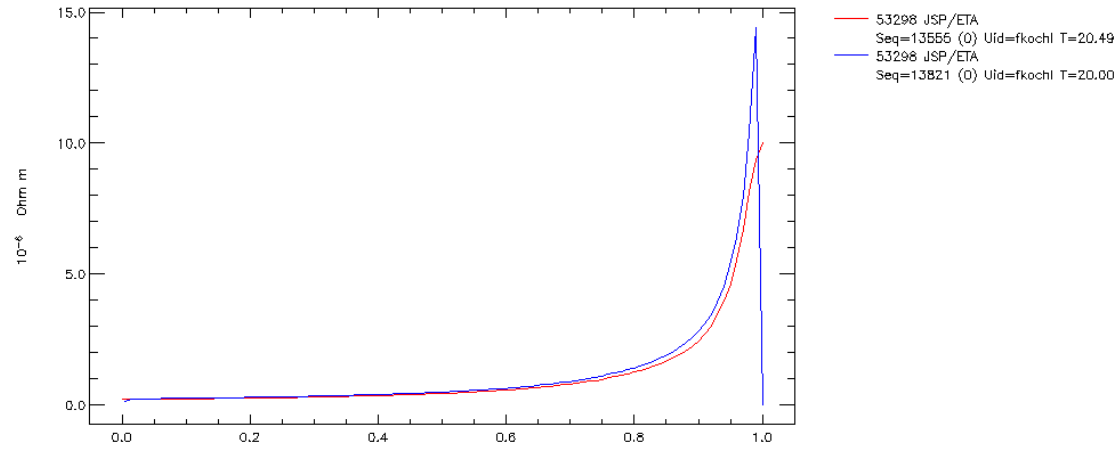
Case 1, Comparison with JETTO rerun, using ASTRA profiles at t = 20s as initial profiles:

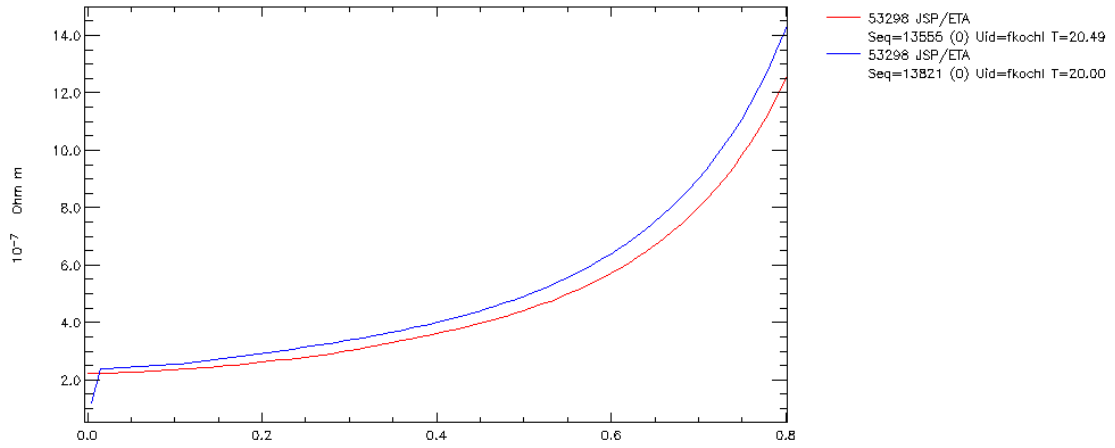
JETTO rerun stored as jan2709/seq.2/ppfseq.13821

<u>Profiles at t = 20s:</u>

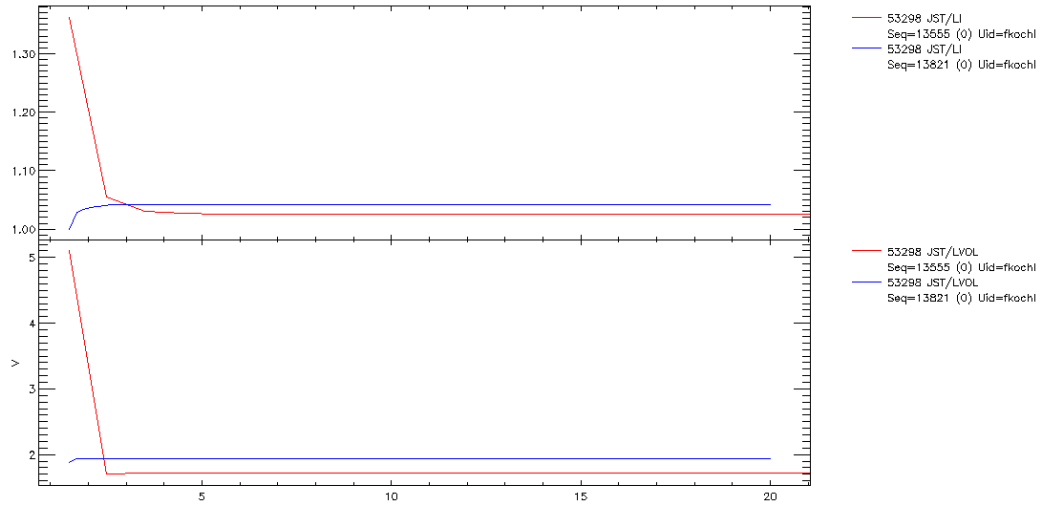








LI, LVOL:



Good agreement in NE, TE, TI at t = 20s, if JETTO is rerun with the final profiles of the ASTRA run as initial profiles.

Even though JST/CUR is equal to 0.5 MA both in ASTRA and JETTO, the total amount of current is different in JSP/JZ!

The JSP/Q profiles seem to differ by a constant proportionality factor (~8%).

The conductivity JSP/ETA predicted by ASTRA is slightly smaller than with JETTO.

~2% difference in JST/LI

Case 2 :

- All data are frozen at t=1.5 s.
- The only evolving quantity is j(rho,t).
- Bootstrap current is set to zero.
- **elongation = 2.0 (JETTO: elongation = 1.6, failure with 2.0)**
- **Ipl=1.5MA**

ASTRA run:
MDS+: gperev seq#9, shotid 54700
ppf: fkochl/ppfseq.13556
JETTO run:
fkochl/jan2709/seq.7/ppfseq.13826

Comparison not possible, JETTO equilibrium solver fails with kappa = 2.0 in these conditions.

Case 3 :

- All data are frozen at t=1.5 s.
- The only evolving quantity is j(rho,t).
- **Bootstrap current is on (NCLASS).**

ASTRA run:
MDS+: gperev seq#10, shotid 54703
ppf: fkochl/ppfseq.13557
JETTO run:
fkochl/jan2709/seq.3/ppfseq.13822

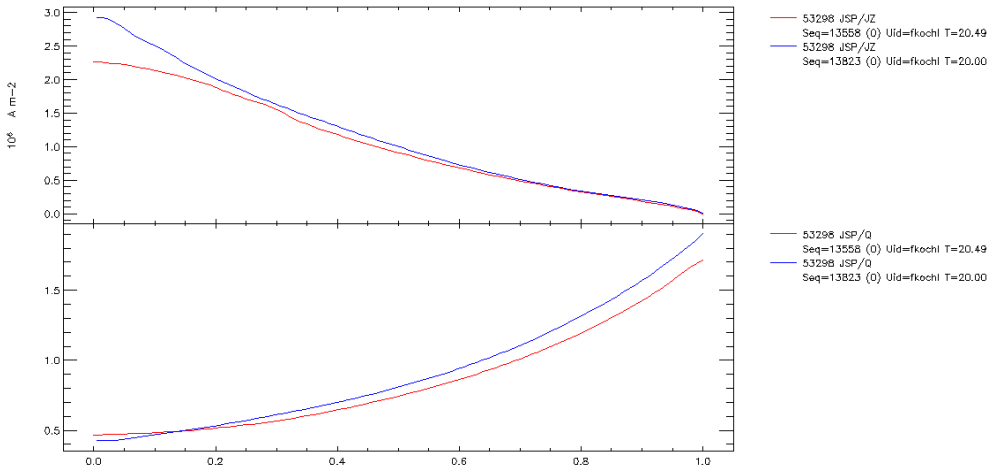
Almost no difference compared to case 1, bootstrap current fraction in JETTO is ~0.3%.

Case 4 :

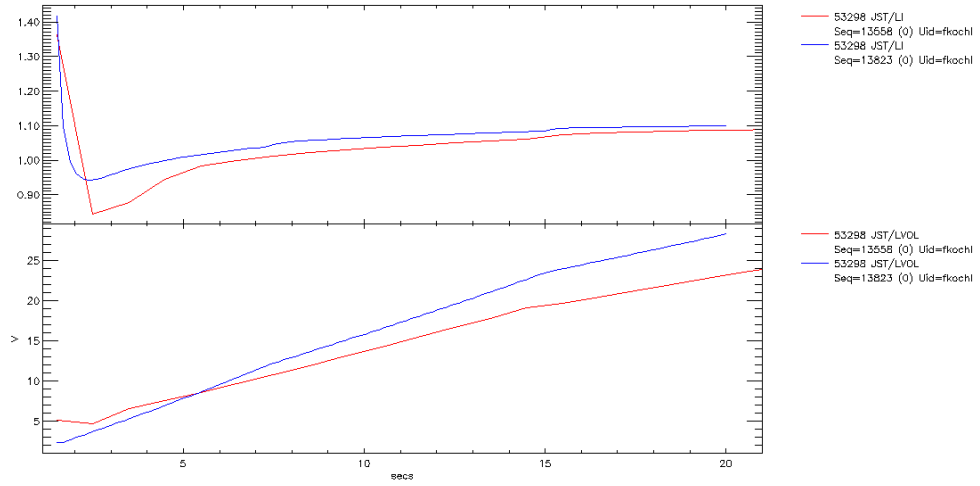
- All data are frozen at t=1.5 s.
- The only evolving quantity is j(rho,t).
- **Bootstrap current is on (NCLASS)**.
- **Ipl = Ipl(t)**

ASTRA run:
MDS+: gperev seq#11, shotid 54705
ppf: fkochl/ppfseq.13558
JETTO run:
fkochl/jan2709/seq.4/ppfseq.13823

Profiles at t = 20s:



LI, LVOL:

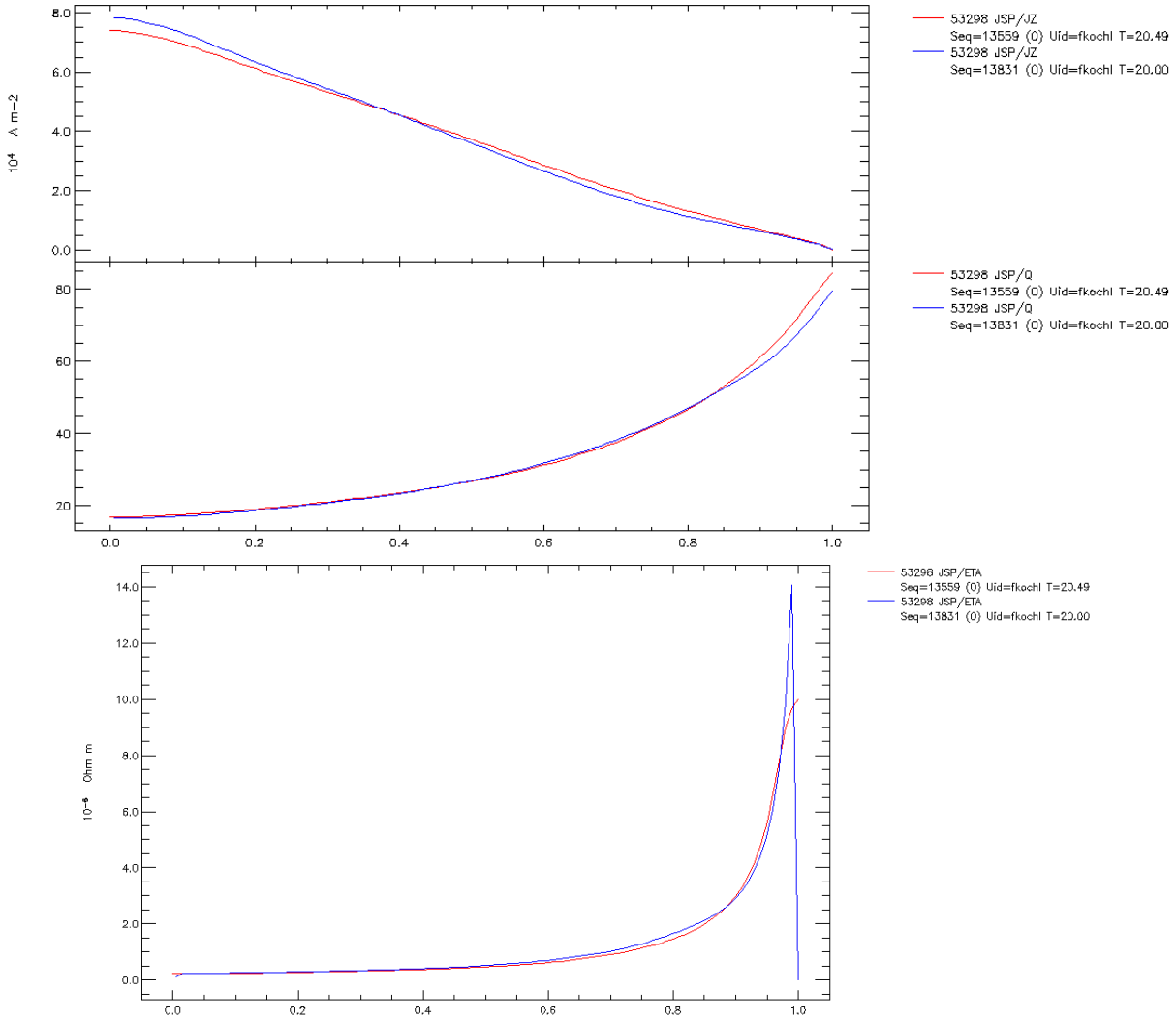


Case 5 :

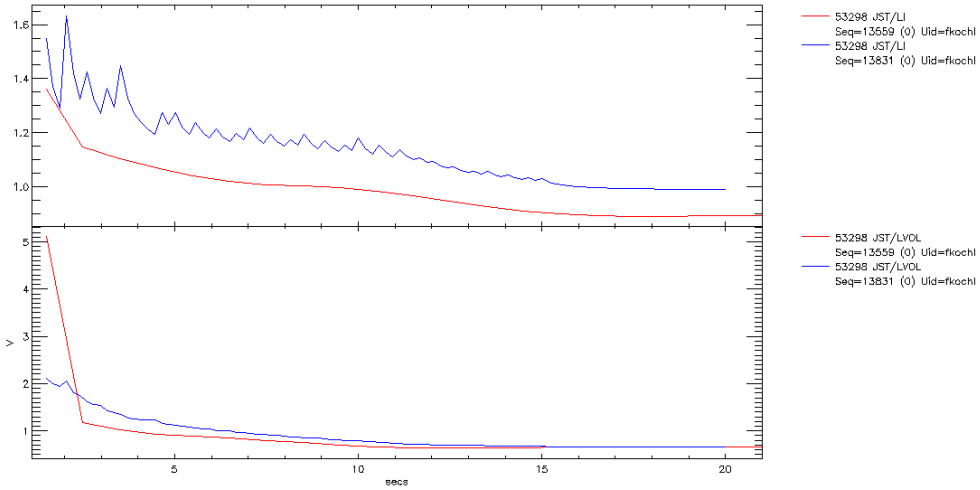
- All data are frozen at t=1.5 s.
- The only evolving quantity is j(rho,t).
- **Bootstrap current is on (NCLASS)**.
- **Evolving shape**

ASTRA run:
MDS+: gperev seq#12, shotid 54708
ppf: fkochl/ppfseq.13559
JETTO run:
fkochl/jan2709/seq.12/ppfseq.13831

Profiles at t = 20s:

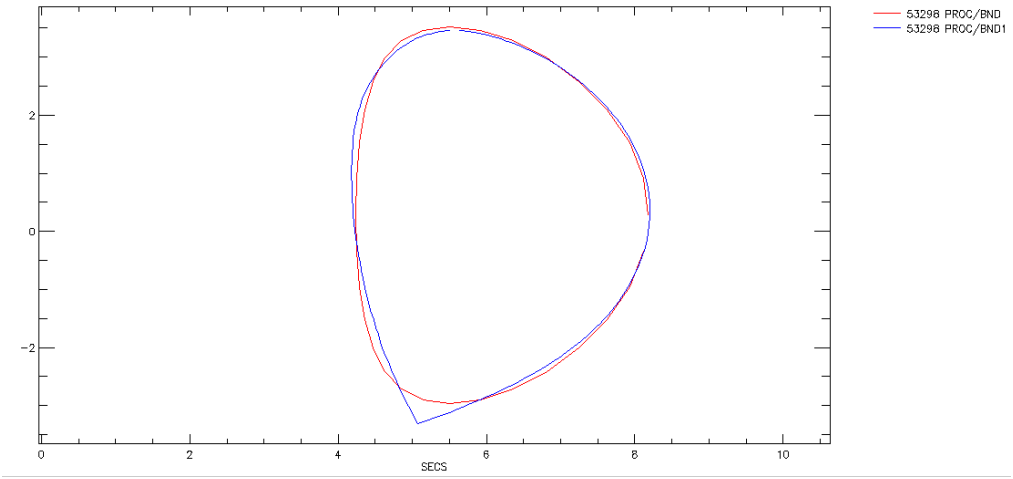


LI, LVOL:



Much better agreement for JSP/JZ with evolutionary boundary (same observation was made in comparisons between CRONOS and JETTO).

The difference in JSP/Q at the edge might be related to different boundary shapes, shown below at t = 20s:

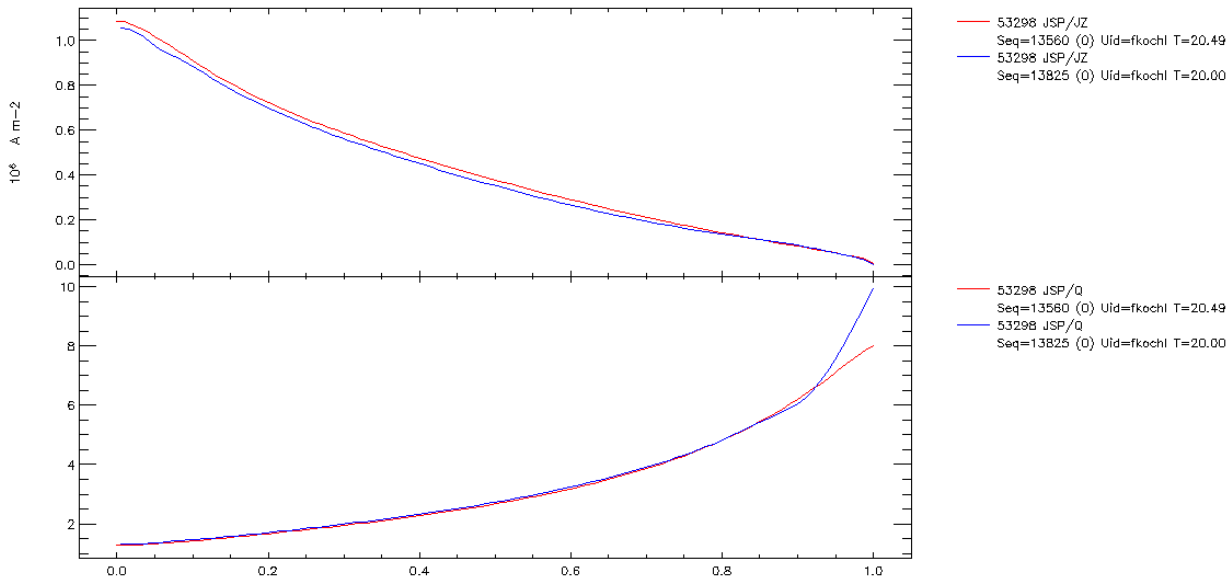


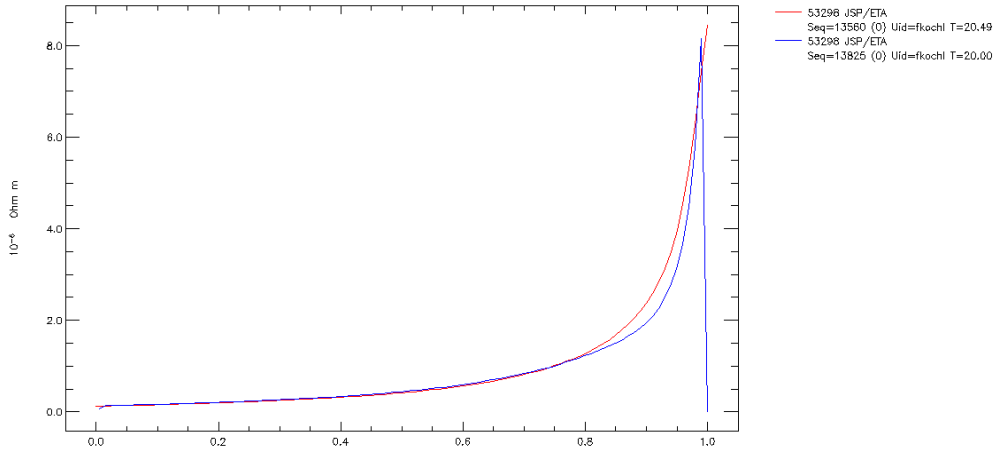
Case 6 :

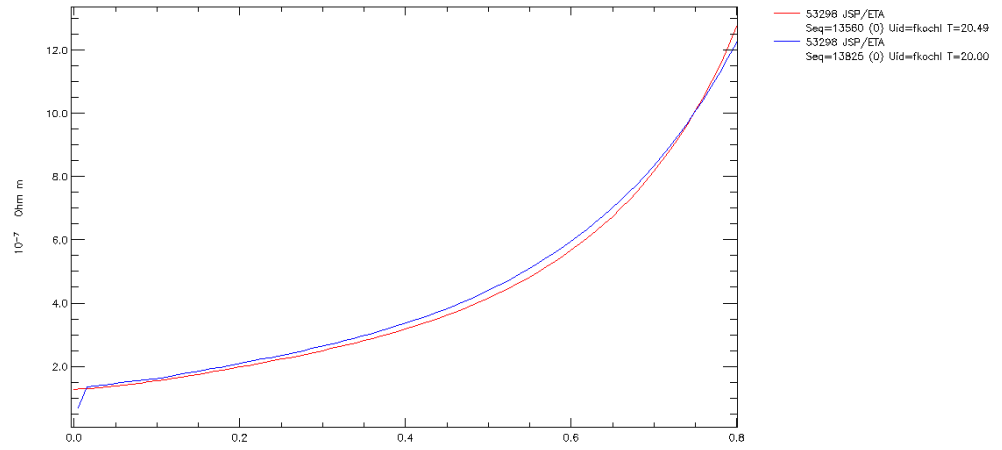
- All data are frozen at t=1.5 s.
- The only evolving quantity is j(rho,t).
- **Bootstrap current is on (NCLASS)**.
- **Ipl = Ipl(t)**
- **Evolving shape**
- **Zeff = Zeff(t)**
- **Btor = Btor(t)**

ASTRA run:
MDS+: gperev seq#13, shotid 54709
ppf: fkochl/ppfseq.13560
JETTO run:
fkochl/jan2709/seq.6/ppfseq.13825

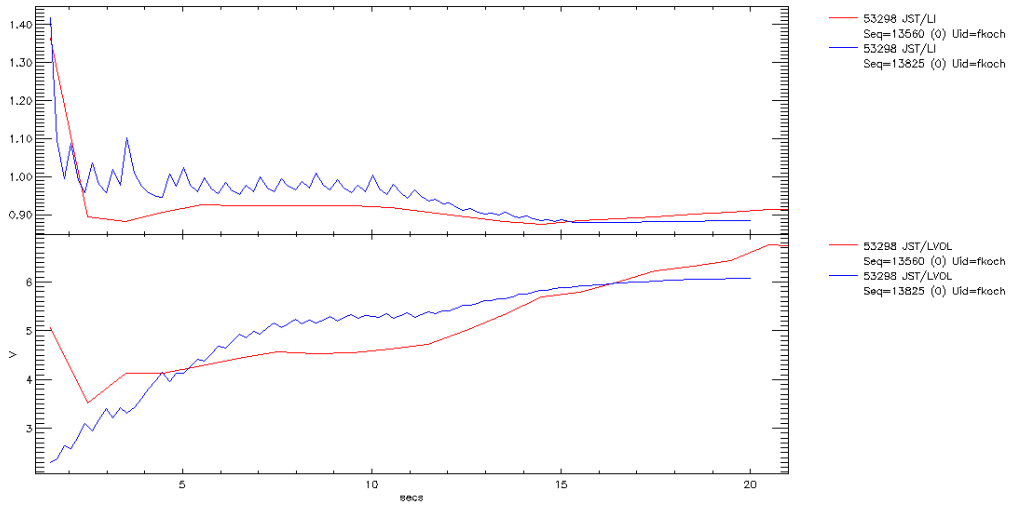
<u>Profiles at t = 20s:</u>

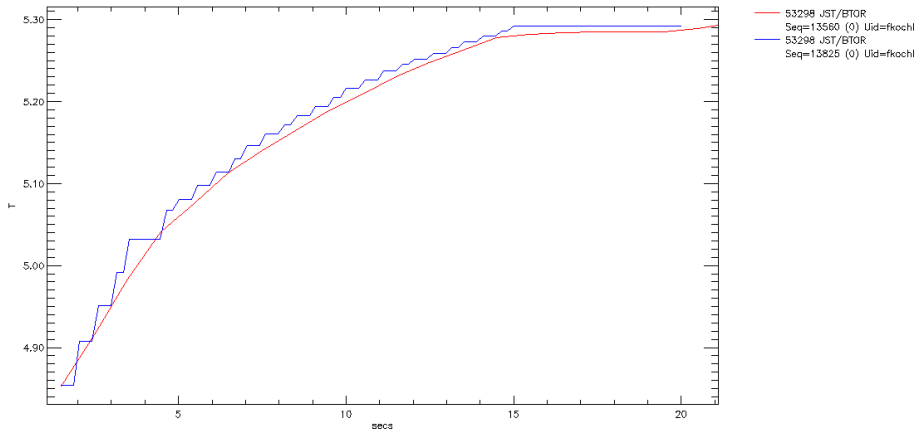



53298 JSP/ETA
Seq=13560 (0) Uid=fkochl T=20.49
53298 JSP/ETA
Seq=13825 (0) Uid=fkochl T=20.00
10⁻⁶ Ohm m
0.0
2.0
4.0
6.0
8.0
0.0
0.2
0.4
0.6
0.8
1.0


53298 JSP/ETA
Seq=13560 (0) Uid=fkochl T=20.49
53298 JSP/ETA
Seq=13825 (0) Uid=fkochl T=20.00
10⁻⁷ Ohm m
2.0
4.0
6.0
8.0
10.0
12.0
0.0
0.2
0.4
0.6
0.8

LI, LVOL,BTOR:


53298 JST/LI
Seq=13560 (0) Uid=fkoch
53298 JST/LI
Seq=13825 (0) Uid=fkoch
53298 JST/LVOL
Seq=13560 (0) Uid=fkoch
53298 JST/LVOL
Seq=13825 (0) Uid=fkoch
1.40
1.30
1.20
1.10
1.00
0.90
V
3
4
5
6
5
10
15
20
secs



Whereas JSP/Q at the edge is lower in JETTO in case 5, it is lower in ASTRA in case 6.