Remote ISM meeting, May 11 2011

ETS V&V activity during coming Code Camp

23-27 May Helsinki

Team:

V. Basiuk, J. Ferreira (remotely), D. Kalupin, F. Koechl (remotely), I.Voitsekhovitch - current diffusion, transport

I. Ivanova-Stanik, R. Stankiewicz - impurity

Benchmark case prepared within ISM-ACT1:

- **JET 77922: hybrid scenario with current overshoot, Btor = 2.3 T, Ipl = 1.7 MA, high triangularity (0.38), 18 MW of NBI, nl = 4.8e19 m-3, βN = 2.8**
- **Selected initial time slice 7.7 s: same input data for all codes taken from TRANSP run I14 with normalised square root of toroidal flux coordinate. Input PPFs: voits/TRAU/TE,TI,NE,NC,CUR,Q,OMEG seq. 431, TRAU/ZEF seq. 433**
- **Bohm/gyroBohm transport model for χe and χi (+ 0.1 m2/s)**
- **Constant density profile taken at 7.7s**
- **Long run till steady state (40 s, limited by the ETS run time)**
- **Gaussian profile for H&CD (centred at ρ=0, half-width $\Delta\rho$=0.3), Ptot=18 MW, Ini=0.12 MA. Power & current are not evolving. 70% on ion and 30% electron heating. Ohmic heating, equipartition**
- **Two cases : i) Spitzer resistivity, zero BS current, Zeff=1, ii) Neoclassical resistivity & BS current**

ASTRA/CRONOS/JETTO runs for ETS V&V

- **ASTRA runs for two cases:** ***(1) current diffusion;***
  (2) current diffusion + Te + Ti. Extra diffusion coefficient to stabilise numerical oscillations: $\chi=\chi BgB + 0.1$ m2/s. Zeff=1

  ~fable/public/astra_sims_march_2011/README_JET_results + ASCII&matlab files

- **JETTO runs:** **dkalupin PPF seq 434 (current diffusion), fkochl PPF seq. 467 (j, Te, Ti).** ***$\chi=\chi BgB + 0.1$ m2/s. Zeff=1***

- **CRONOS runs:**
  ~basiuk/public/ets_benchmark_4ISM_77922_resultat.mat (exper. Zeff profile, 8.1 - 29 s) and ets_benchmark_JET_77922_Zeff_1_resultat.mat (Zeff=1, 8.1 - 14 s)

- **Input CPO from CRONOS, JETTO and TRANSP are created**

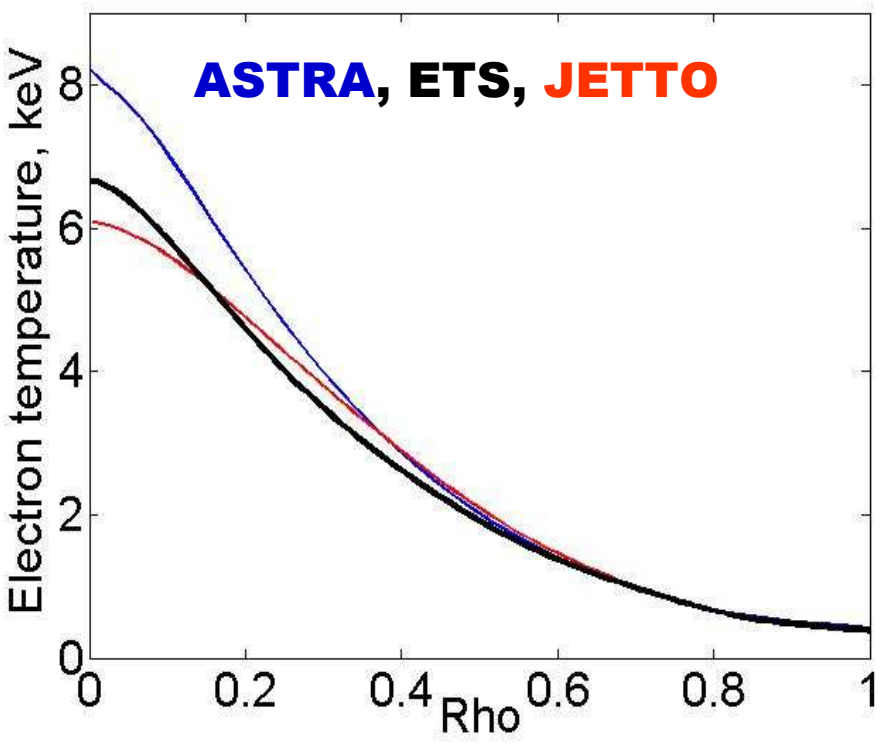
- **ETS runs:**
  ~kalupin/public/itmdb/itm_tree/test/4.08b/mdsplus/0/euitm_779220011.*(current diffusion) and *779220013.* (j, Te, Ti)
  + runs of Vincent are in progress

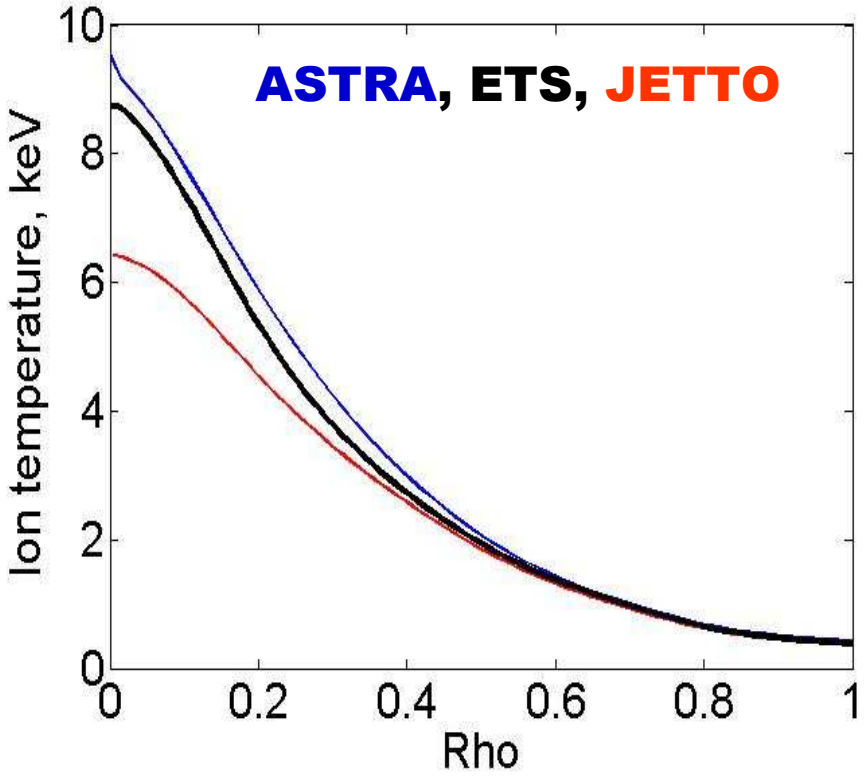
Summary of runs (j+Te+Ti)

	Time interval	Heating	Current drive	Equilibrium	Transport	Output files
ASTRA	7.7-47.7 s	OH + Gauss + Pei	Gauss, no BS, Spitzer, Zeff=1	3 moment	BgB + 0.1 m2/s	*~fable/public/astra_sims_march_2011/README_JET_results + ASCII&matlab files*
CRONOS	8.1 - 29 s 8.1 - 14 s	OH + Gauss + Pei OH + Gauss + Pei	Gauss, NCLASS, Zeff, exp Gauss, NCLASS, Zeff=1	HELENA HELENA	BgB BgB	~basiuk/public/ets_benchmark_4ISM_77922_resultat.mat ~basiuk/public/ets_benchmark_JET_77922_Zeff_1_resultat.mat
JETTO	7.7 - 47.7 s	OH + Gauss + Pei	Gauss, no BS, Spitzer, Zeff=1	ESCO	BgB + 0.1 m2/s	dkalupin PPF seq 434 (j), fkochl PPF seq. 467 (j, Te, Ti)
ETS: V. Basiuk	7.7 – 12.5 s	OH + Gauss + Pei	Gauss, NCLASS, Zeff, exp	HELENA	BgB	
ETS: D. Kalupin	7.7 – 40.7 s	OH + Gauss + Pei	Gauss, no BS, Spitzer, Zeff=1	3 moment	BgB + 0.1 m2/s	~kalupin/public/itmdb/itm_tree/test/4.08b/mdsplus/0/euitm_779220011.*(j) and *779220013.* (j, Te, Ti)

ASTRA/ETS/JETTO run for JET77922 (1)

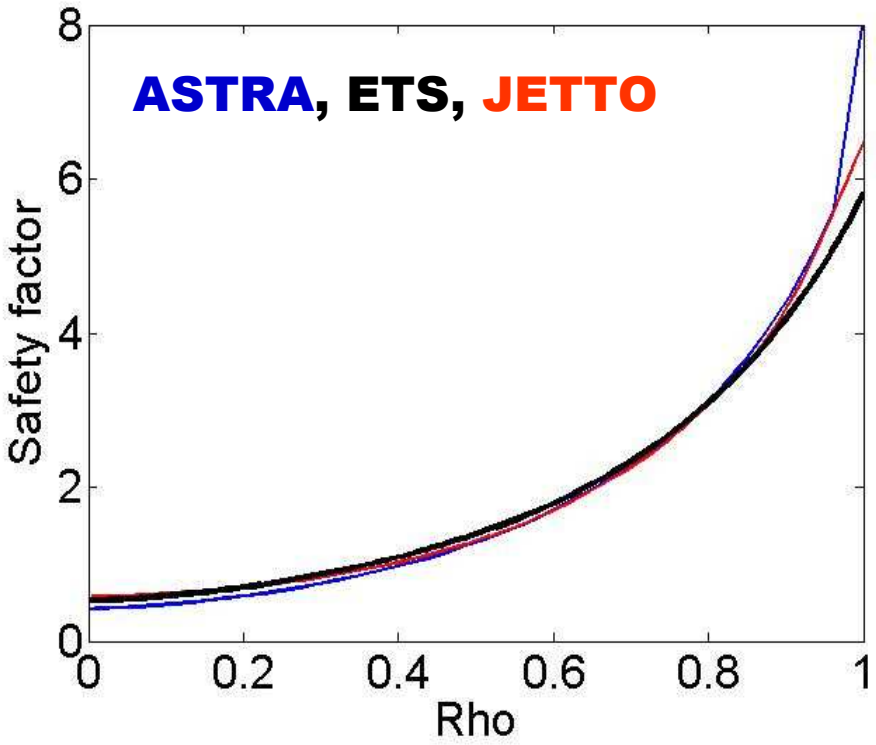
Simulations of equilibrium, current diffusion, Te and Ti. Spitzer resistivity, χBgB + 0.1 m2/s, Gaussian H&CD, zero BS current.

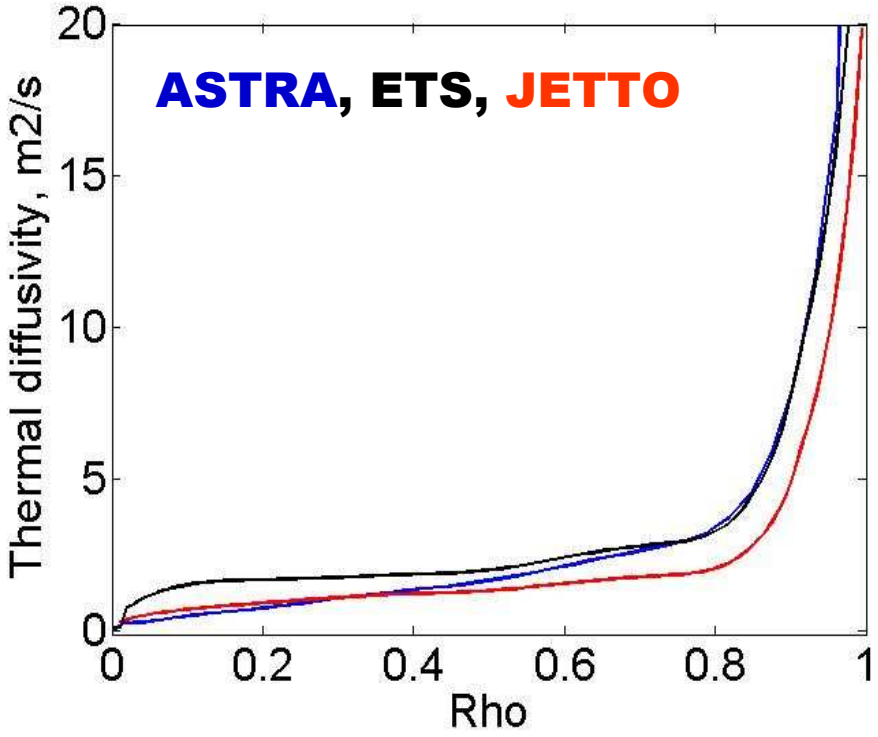




All profiles are taken at 40.7 s, i.e. at the last available ETS time slice

ASTRA/ETS/JETTO run for JET77922 (2)





- lower central q in ASTRA (by factor ~1.6 as compared to the ETS q^2) may explain lower χ and higher core temperature in ASTRA as compared to ETS

- more detailed comparison is needed

Outcome of discussion:

- **ASTRA/CRONOS/ETS/JETTO runs for #77922 to test two workflows:**

  - Bohm-gyroBohm transport, Spitzer resistivity, zero BS current, Zeff=1

  - Bohm-gyroBohm transport, NCLASS for resistivity and BS current, Zeff=1

- **Summary tables to be completed with output files (p. 8 and 9)**

Current drive case 1: jGauss, no BS current, Spitzer resistivity, Zeff=1

	Time interval	Heating	Equilibrium	Transport	Output files
ASTRA	**7.7- 47.7 s**	**OH + Gauss + Pei**	**3 moment**	**BgB + 0.1 m2/s**	***~fable/public/astra_sims_march_2011/README_JET_results + ASCII&matlab files***
CRONOS	**7.7-47.7 s**	**OH + Gauss + Pei**	**HELENA**	**BgB + 0.1 m2/s**	
JETTO	**7.7 - 47.7 s**	**OH + Gauss + Pei**	**ESCO**	**BgB + 0.1 m2/s**	**dkalupin PPF seq 434 (j), fkochl PPF seq. 467 (j, Te, Ti)**
ETS: V. Basiuk	**7.7 - ?**	**OH + Gauss + Pei**	**HELENA**	**BgB + 0.1 m2/s**	
ETS: D. Kalupin	**7.7 – 40.7 s**	**OH + Gauss + Pei**	**3 moment**	**BgB + 0.1 m2/s**	**~kalupin/public/itmdb/itm_tree/test/4.08b/mdsplus/0/euitm_779220011.*(j) and *779220013.* (j, Te, Ti)**

Current drive case 2: jGauss, NCLASS for BS current and resistivity, Zeff=1

	Time interval	Heating	Equilibrium	Transport	Output files
ASTRA	7.7-47.7 s	OH + Gauss + Pei	3 moment	BgB + 0.1 m2/s	
CRONOS	7.7-47.7 s	OH + Gauss + Pei	HELENA	BgB +0.1 m2/s	
JETTO	7.7 - 47.7 s	OH + Gauss + Pei	ASTRA equ	BgB + 0.1 m2/s	
ETS: V. Basiuk	7.7 - ?	OH + Gauss + Pei	HELENA	BgB + 0.1 m2/s	
ETS: D. Kalupin	7.7 – ?	OH + Gauss + Pei	3 moment	BgB + 0.1 m2/s	

Actions for coming Code Camp:

- **ETS WF with Spitzer resistivity, 3 moment equilibrium & Zeff=1 (Denis, David, Irina):**

  - ASTRA & ETS runs with simulated equilibrium to compare computed Spitzer conductivity (ETS output for conductivity?) and Bohm-gyroBohm transport

  - equilibrium + current diffusion (ASTRA&JETTO runs are done, repeat ETS for conductivity and voltage simulations? (ETS output is needed)

  - comparison of heating profiles (ETS output separately for OH, Pei and other heatings?)

  - other suggestions?

Actions for coming Code Camp:

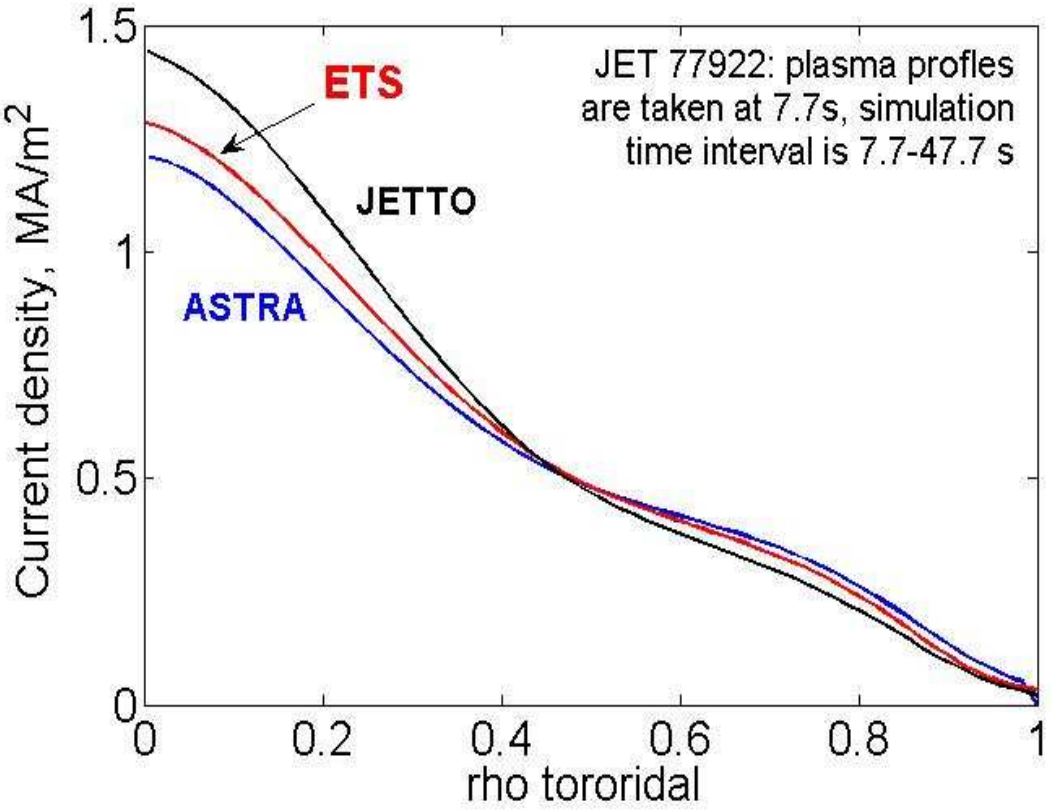
- **ASTRA runs with NCLASS and Zeff =1 for comparison with CRONOS and Vincent's WF (Irina)**
- **CRONOS and ETS run with BgB + 0.1 m2/s, Zeff=1, restart at 7.7 s (Vincent, Jeronimo)**
- **Test of two WFs by "test user" (Irina, Vincent, Denis) – should Irina try to run Vincent and Denis WF and help to test different issues (time step, equilibrium recalculation step, …) ?**
- **Can we use the same/similar equilibrium? Use of eqdsk?**
- **Other actions?**

Remote actions:

- **Check JETTO settings: transport coefficients, heating profiles (Florian, Denis, Gerard, Irina)**
- **Re-run JETTO with corrected settings and ASTRA equilibrium (Florian, Denis)**

ETS/ASTRA/JETTO benchmarking for JET HS 77922

ASTRA/ETS/JETTO: current diffusion with Spitzer resistivity and zero bootstrap current



- JET HS 77922, TRANSP run I14 is used for input data;

- TRANSP -> ASTRA

TRANSP->PPFs ->JETTO ->ETS

- prescribed ne, Te & Ti are taken at 7.7s and frozen, Zeff=1

- run for 40 s

- JETTO: ppf dkalupin/seq. 434

- ASTRA: voits/a620/.res/lf95/ETS77922_j_z1 and

/afs/efda-itm.eu/imp3/user/voitsekh/ASTRA_ETS_test_March2011/ETS77922_j_z1

- ETS: 77922/run 11