NURESAFE WP1.4
HIGHER-RESOLUTION VVER MSLB

KIT results for the nodal based scenarios using DYN3D-COBRA-TF

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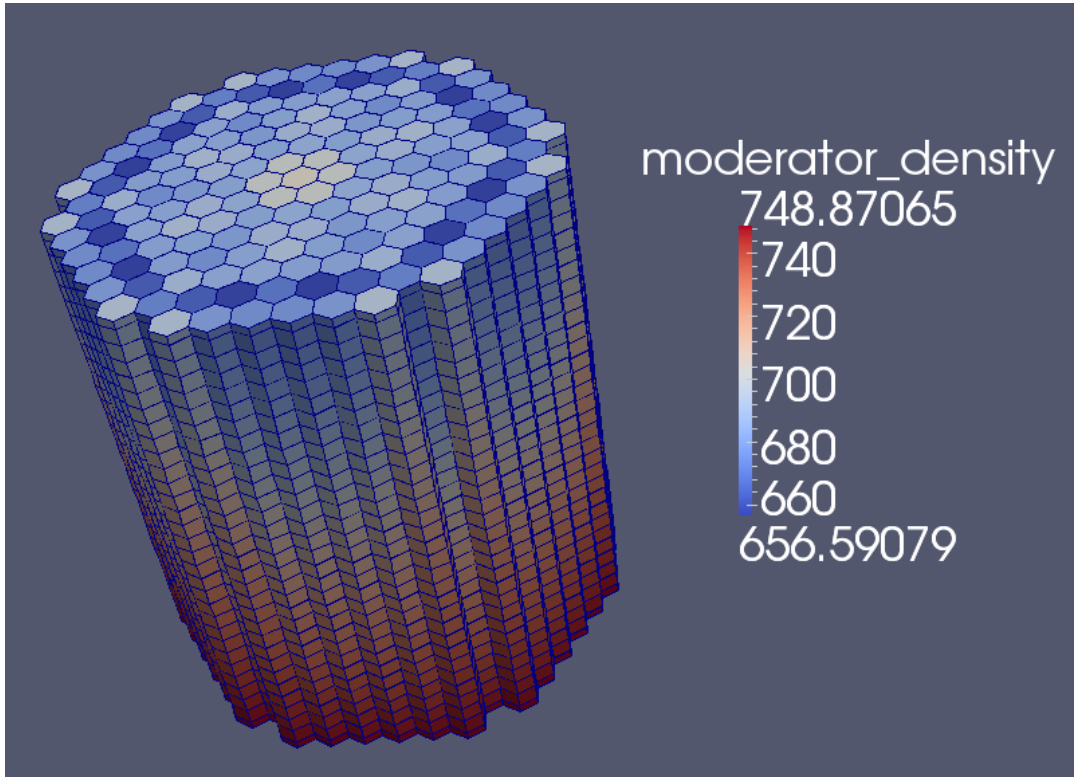
Outline

- **Results obtained with DYN3D-COBRA-TF using the compact and extended library.**
  - Steady states.
  - Transient.
- **Conclusion and Outlook.**



Introduction

- **Coupling scripts as well as the input decks have been uploaded in the svn repository and can be found there.** **https://www-svn-corpus.cea.fr/nuresafe/SAT/TEST**
- **All the results will be reported within the corresponding deliverable.**
- **Progress has been done at nodal level and the goals have been achieved:**
  - Benchmarking of the compact library
  - Benchmarking of the extended library
  - Running of the coupled transient within SALOME

Summary of DYN3D_2G results at HZP using the COMPACT library

State	XS library	Keff	Fxy	Fz	FQ
0	Scenario 1	1.028537	1.3417	2.9704	4.4586
1a	Scenario 1	0.991076	1.4317	1.9478	2.9579
1b	Scenario 1	0.951282	1.4649	2.7060	4.8320
1b	Scenario 2	1.000611	1.4106	2.8427	4.5707
3	Scenario 1	0.959901	8.2071	2.2996	17.0034
4	Scenario 2	1.001254	1.7848	2.8174	4.7463
5	Scenario 2	1.002236	2.4661	2.7943	6.1993

Note that these results need to be recomputed with a newer version of the XS library (v2.14e)

Summary of DYN3D_MG results at HZP using the EXTENDED library

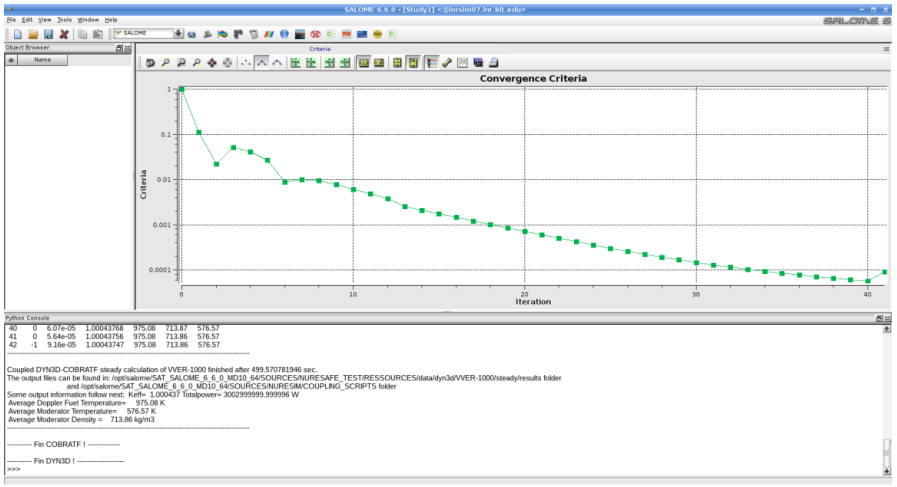
State	XS library	Keff	Fxy	Fz	FQ
0	Scenario 1	1.025032	1.3509	3.0128	4.5395
1a	Scenario 1	0.987484	1.4320	2.0152	3.0542
1b	Scenario 1	0.948108	1.5087	2.7773	5.0920
1b	Scenario 2	0.997288	1.4346	2.9172	4.7576
3	Scenario 1	0.956336	8.0610	2.3613	17.0093
4	Scenario 2	0.997913	1.7606	2.8882	4.9393
5	Scenario 2	0.998863	2.4312	2.8531	6.2456

Note that these results need to be recomputed with a newer version of the XS library **(v2.13_edit (UPM Edit): UpScattering Correction, -n2n)** using the DYN3D_2G version within SALOME

DYN3D/COBRA-TF results at HFP

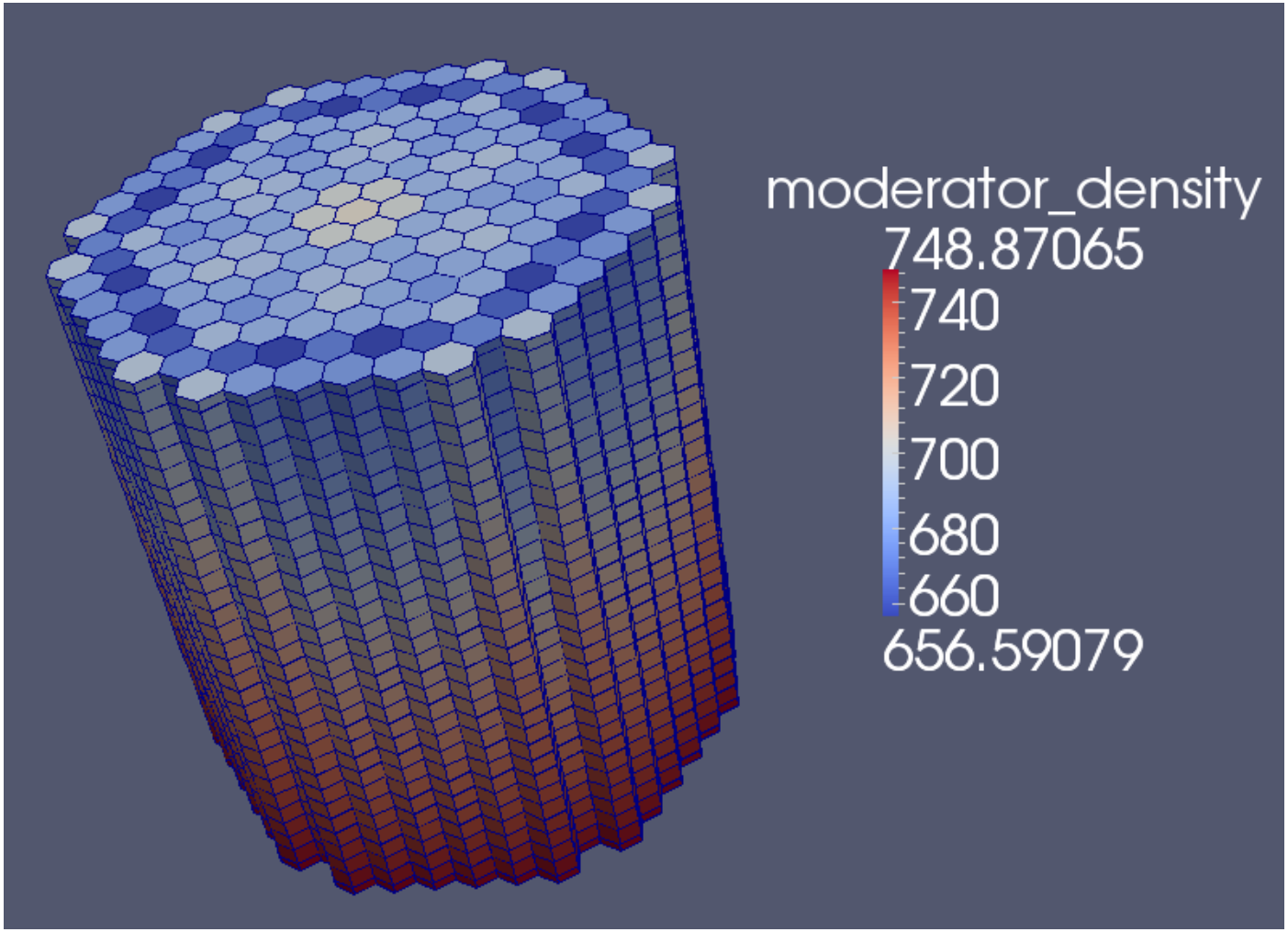
- This case was run using the run_DYN3D_COBRATF.py python script placed in NURESIM/COUPLING_SCRIPTS.

State	TH Code	Keff	Fxy	Fz	FQ	Av. Dop. Temp. [K]	Av. Mod. Dens. [kg/m3]	Av. Mod. Temp. [K]
2	COBRA-TF[1]	0.999705	1.3032	1.1299	1.4701	1004.7	713.81	576.59
	COBRA-TF[2]	1.000533	1.3000	1.1725	1.4427	974.9	714.29	576.38
	FLOCAL	0.993821	1.2561	1.2366	1.5204	1026.22	720.03	576.1



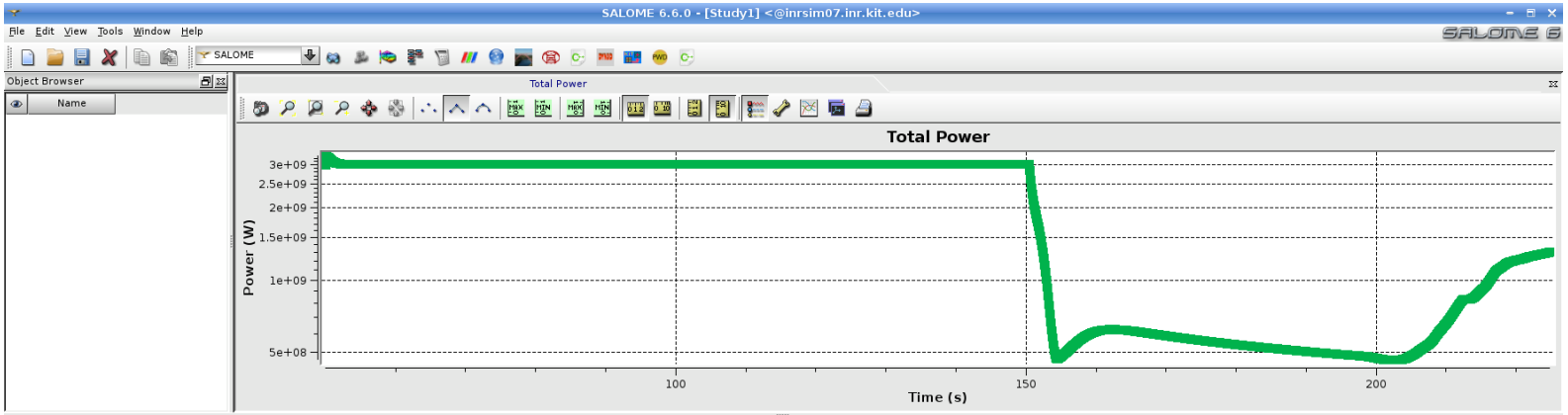
DYN3D/COBRA-TF results at HFP

- 3D Moderator density in the steady state



Issues while transient running

- Using the online display feature causes huge memory overhead in SALOME. It has to be disabled by running without graphical session.

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TTIME  POWER[W]  TDOP[K]  DMOD[kg/m3]  TMOD[K] : 224.656955  1308961808.599535  702.642559  765.552887  548.995314
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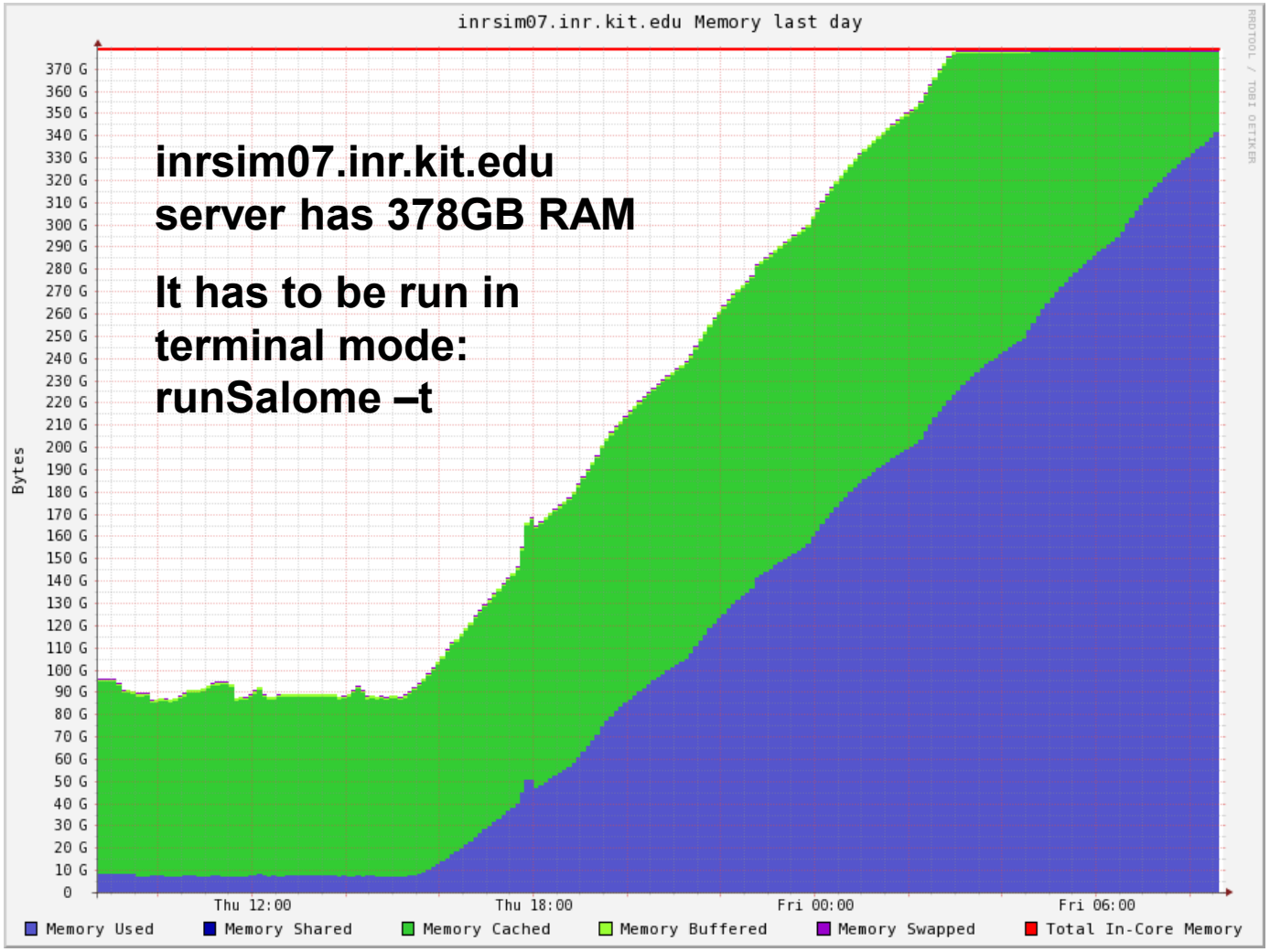
```

Issues while transient running

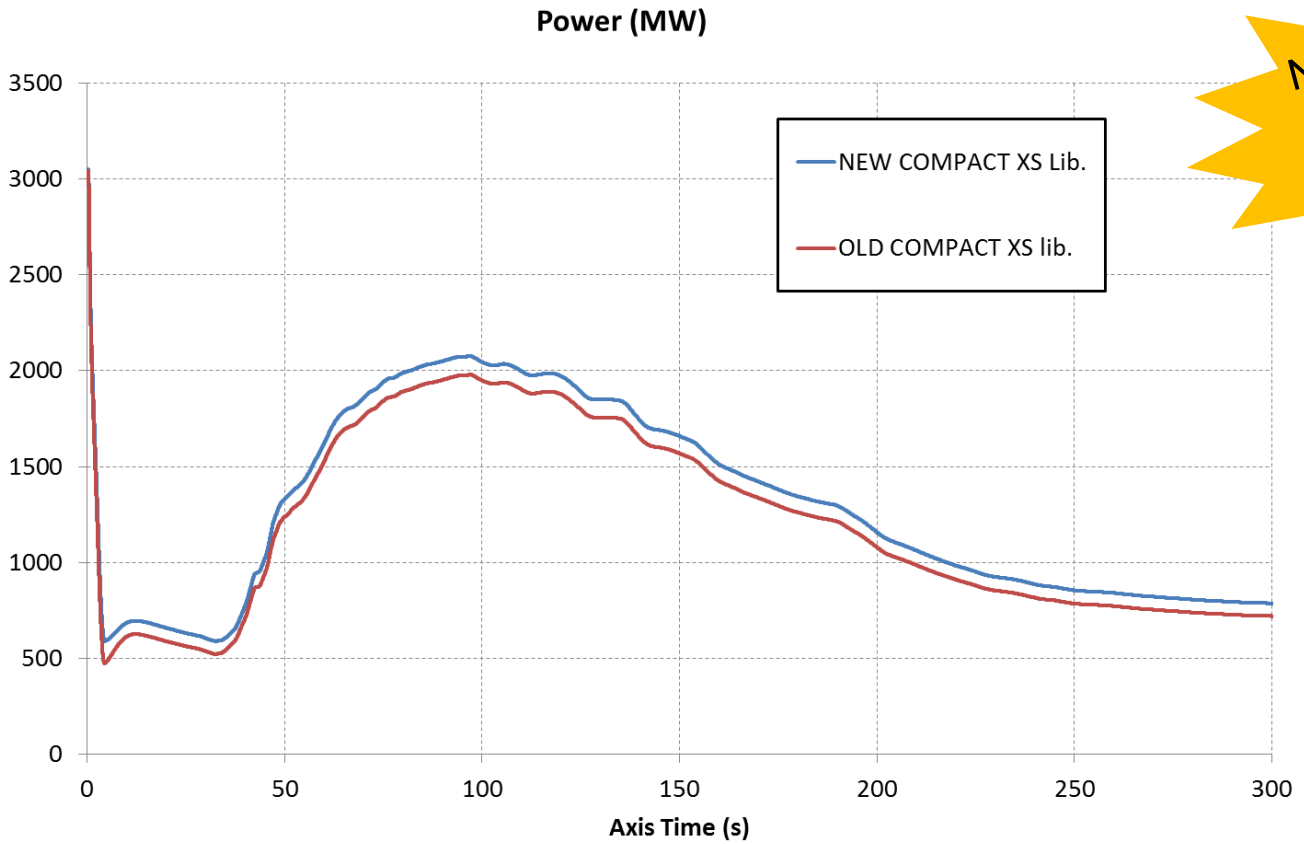
- Memory usage versus time with graphical session.

The axis scale is in GB



Transient DYN3D/COBRA-TF results

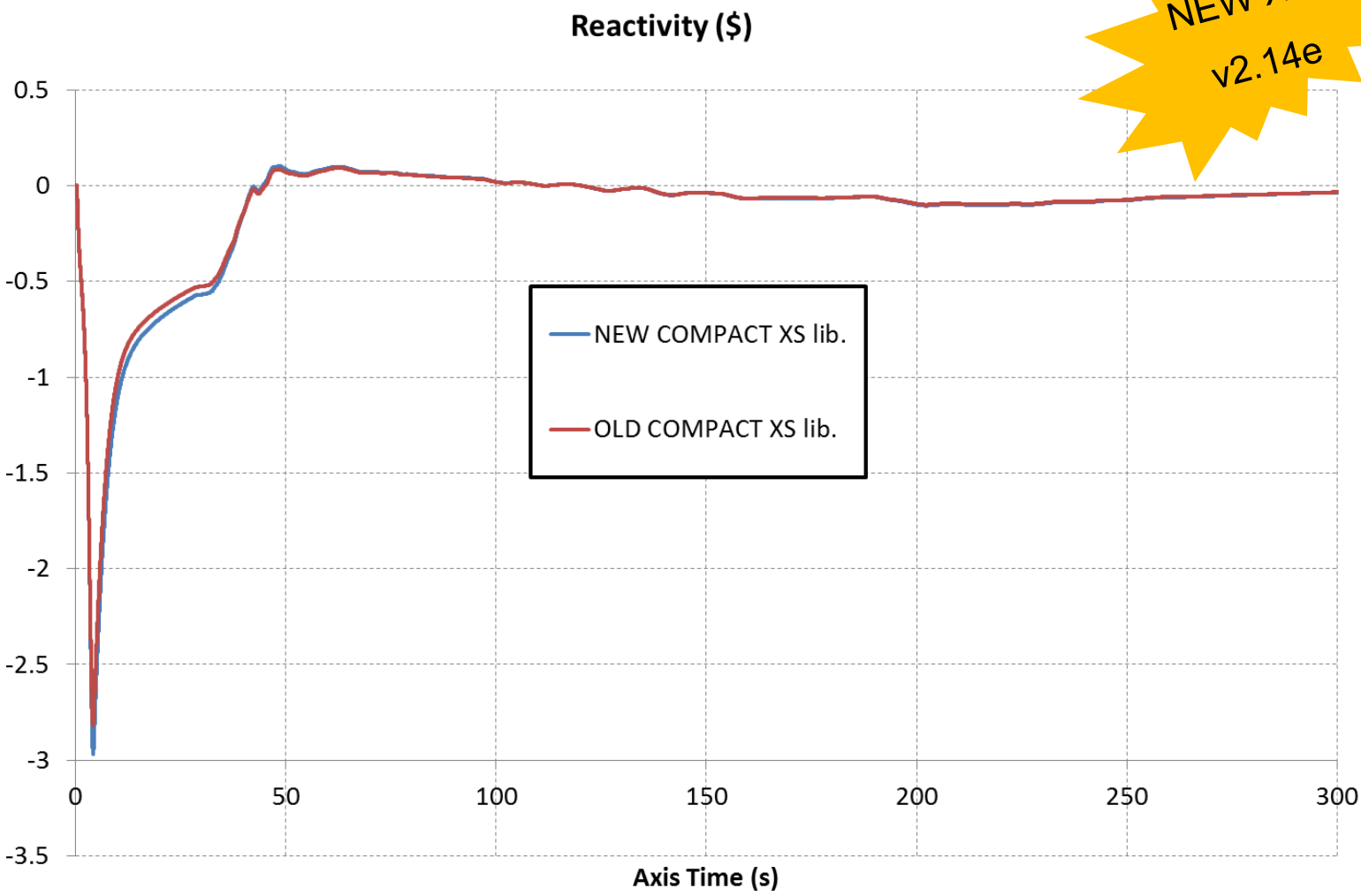
- Due to the strong overcooling, the core recovers criticality and power reaches a maximum of 2072.19MW at t= 94.2s



NEW XS v2.14e

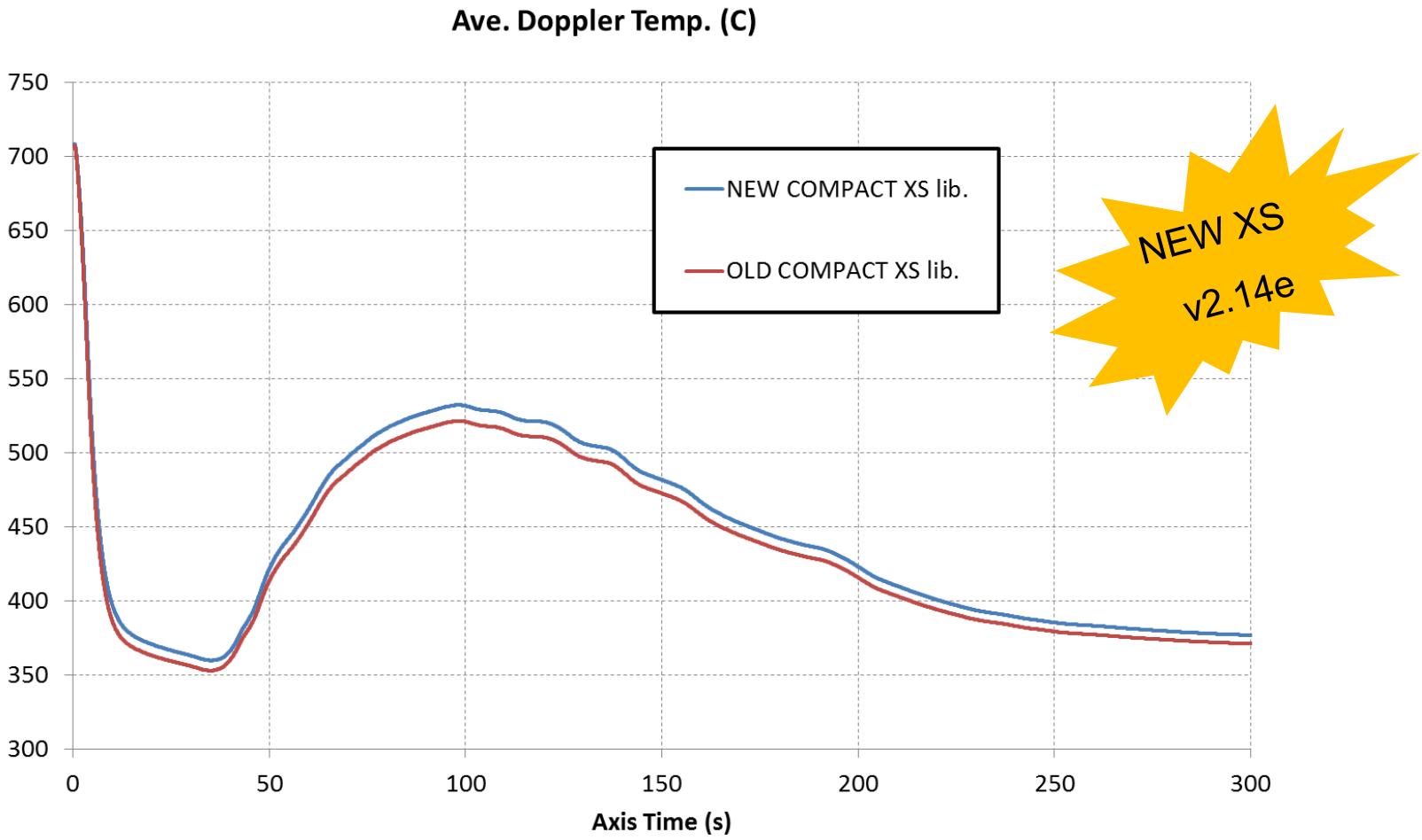
Transient DYN3D/COBRA-TF results

- Reactivity versus time.



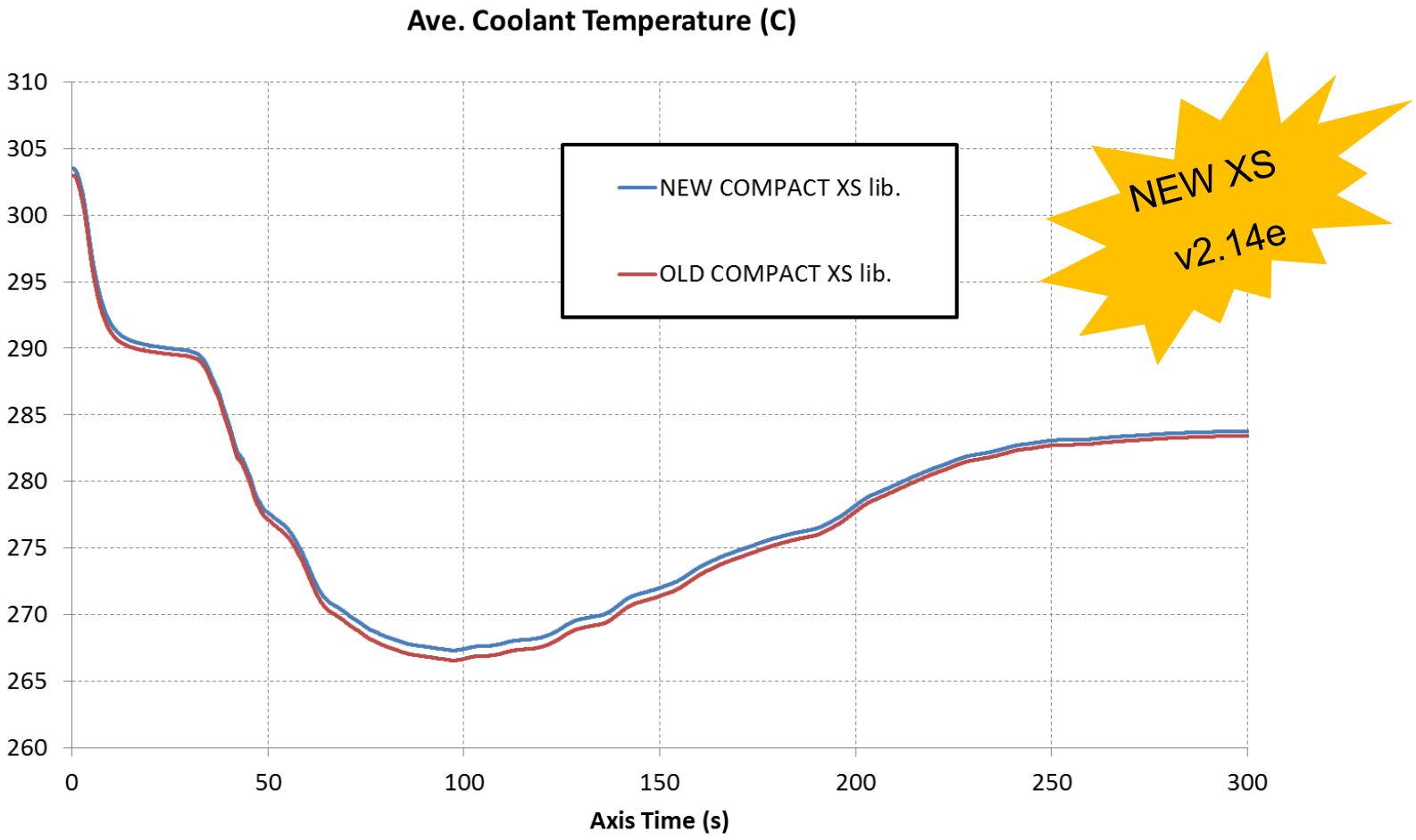
Transient DYN3D/COBRA-TF results

- Core average Doppler temperature (C) versus time



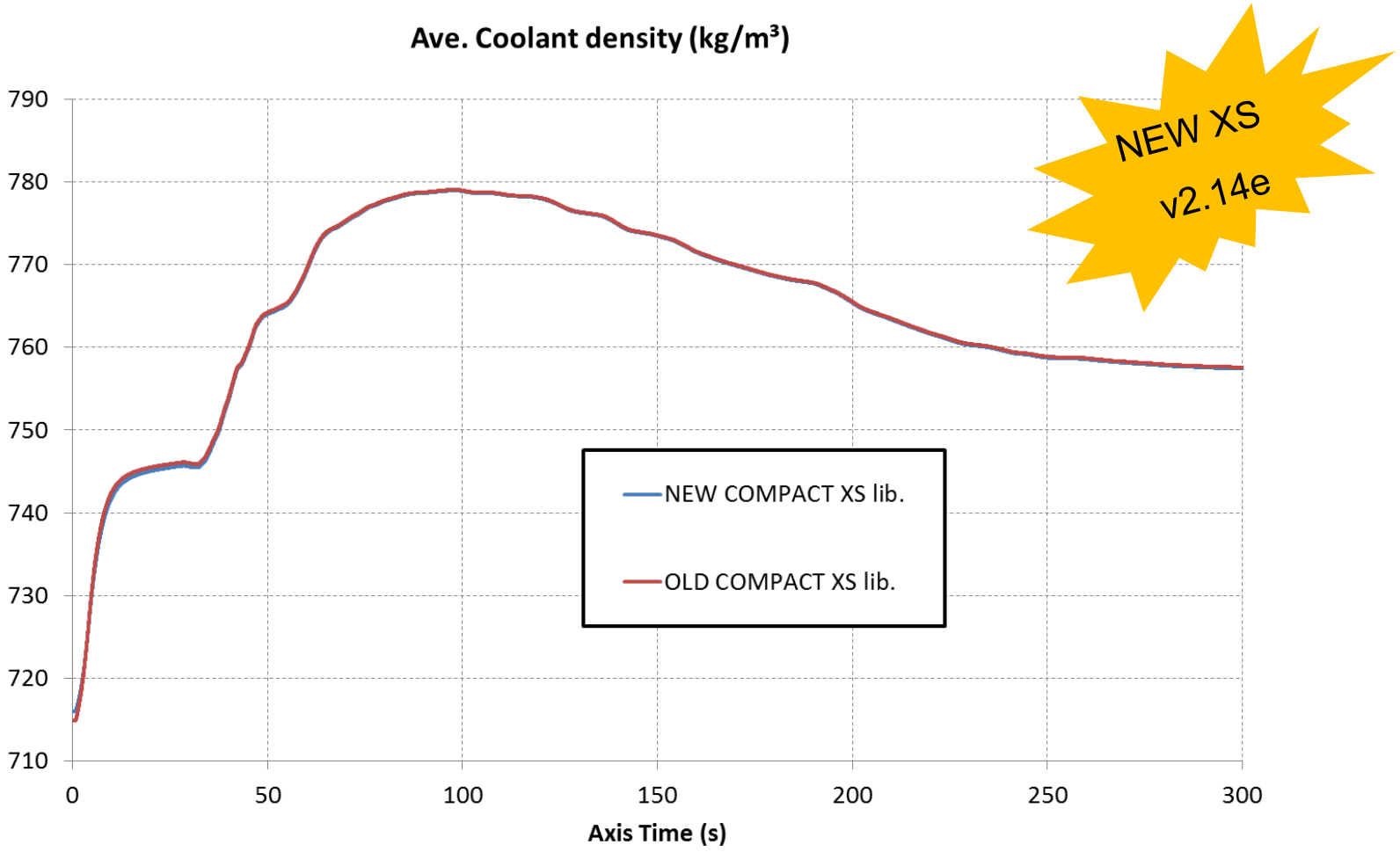
Transient DYN3D/COBRA-TF results

- Core average coolant temperature (C) versus time



Transient DYN3D/COBRA-TF results

- Core average coolant density (kg/m³) versus time



Future work

- **Recompute all the results at SS with the COMPACT library v2.14e**
- **Try to use the DYN3D_2G version with the recalculated EXTENDED libraries v2.13_edit.**
  - The reading subroutines need to be readapted again, an error when reading come out.
  - If it is too much work, maybe the available results using the DYN3D_MG with the EXTENDED library are good enough for the final report.
- **Complete the KIT contribution to D14.41**

THANKS FOR YOUR ATTENTION