Development of the PDS or JT-60SA in 2024.

E. Joffrin

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Objectives: consolidate the simulator and start the actual use for the design of JT-60SA scenarios and the dissemination of the simulator towards the experiment team.

Objectives	People involved	ppm	Status
Optimize ramp-up/down of the scenario at 4.6MA with METIS/EGENE/FEEQS and test the controllers for this scenario with CREATE-NL.	D. Fratollilo M. Mattei JF Artaud W. Bin	3.7pm	Optimization of the controller for the whole pulse on-going.
NICE-METIS simulation with the controller for the scenario at 4.6MA and demonstrate the close loop for the whole scenario.	D. Fratollilo W. Bin JF Artaud Cedric Boulbe	2.5pm	Work will start but not enough resource on this at this stage. People interested in scenario design from the ET are being contacted
Publication/demonstration of the closed loop discharge simulator coupled to controller tested on a full discharge JT-60SA revised initial phase scenario:	E. Joffrin M. Mattei	0.8pm	Outline being developed
Investigate the requirements for the kinetic controller	E. Joffrin M. Mattei R. Nouailletas	0pm	Contact organized with the RAPDENS team

Issues and risks

- ❑ The amount of resources is too small (7.5pm) to execute all the work and dedicated users ot the simulator are missing
- ❑ The Gateway is planned to change next october: this may cause disturbance in the work of the users.
- ❑ The Matlab licence situation in the gateway and at CEA (beyond 2019b) remains uncertain. The update of NICE-METIS into MUSCLES3 coupling library software is a solution being developed but unlikely before 2025
- ❑ Mission to Cadarache would be needed around the end of the year as well as

Participate to Scenario Studies (ORD)

Target scenario to be processed by the simulator

	Ip/Bt (q95)	β_N	H_H	f_{GW}
OP2 Baseline	**4.6 MA/2.28 T (q_{95} ~ 3)**	**< 1.8**	**~ 1**	**0.4-0.6**
OP2 Hybrid	**2.7 MA/1.70 T (q_{95} ~ 4)**	**~ 2**	**> 1.1**	**> 0.4**
OP2 ITB	**1.7-2.0 MA/1.70 T (q_{95} > 6)**	**> 3.5**	**> 1.2**	**> 0.5**

Data required for running the simulator from MECS (0D data and equilibrium sequence)

Ip, BT, R, a,	As function of time
gas (H/D) & njection rate	Gas and injection rate (e/s)
Internal inductance and b	As function of time
EQDSK files	~One every second
Power characteristic	ECRH and NBI power and configuration in time.
Current used in the coils from MECS	As function of time for comparison

Introduce kinetic controller

RAPDENS: control-oriented model to simulate the interaction of the plasma electrons with the vacuum vessel wall and the vacuum region surrounding the plasma: Fusion Eng. Des., 126 (2018)

https://doi.org/10.1016/j.fusengdes.2023.113615

➔ Implemented on AUG and TCV and presently being implemented on WEST

➔ Contact established.

Potential new users from the ET

Potentially from the ET list:

- M. Iafrati (ENEA)
- M. Baruzzo (RFX-ENEA)
- M. Schneider (IO)
- L. Di Grazia (CREATE)
- C. Perez Von thun (IPPLM
- P. Moreau (CEA)
- J. Morales (CEA)