



Discharge simulator development

WPSA Code Management Area Progress Meeting

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Existing WORKFLOW

Step 1 – Scenario Definition

Shape Generator and Optimizer
(CREATE-EGENE)

METIS Scenario preparation and optimization. Discharge analysis and flux consumption estimation

Step 2 – Limit Assessment and Waveforms optimization

Tools for nominal feedforward currents optimization in view of closed loop simulations

FEEQS Code
Poloidal currents and voltage optimization and force limits assessment

Step 3 – Closed loop coupled dynamic simulations

CREATE-NL (FBE)
Closed loop dynamic simulator



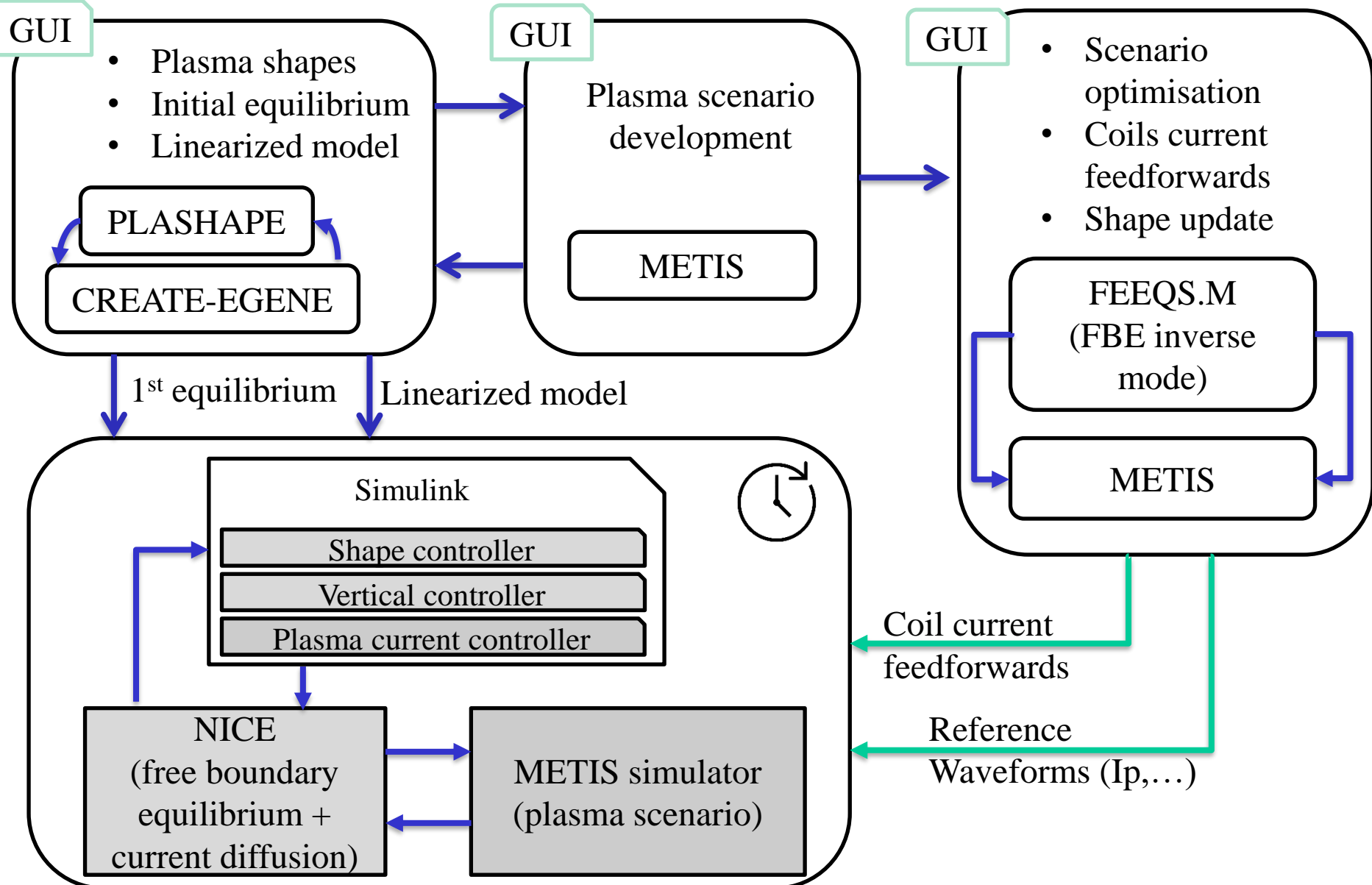
METIS
Light transport simulator

Step 4 – Closed loop coupled dynamic simulations

CREATE
Magnetic Controllers



NICE-METIS
Equilibrium + transport simulator



Status of the 2024 activities

Study of the 4.6 MA Deuterium Scenario

- METIS run (Scenario_4.6MA_deuterium_high_neped_quasi_flat file provided by *J.F. Artaud*)
- Equilibrium current calculation with NICE
- Shape optimization and current re-calculation with EGENE (upper X-point and flux consumption issues)
- Controller tuning and closed loop dynamic simulations with CREATE-NL

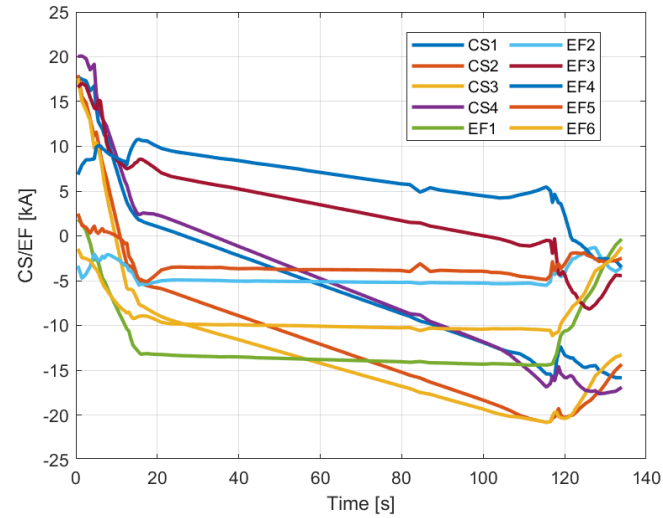
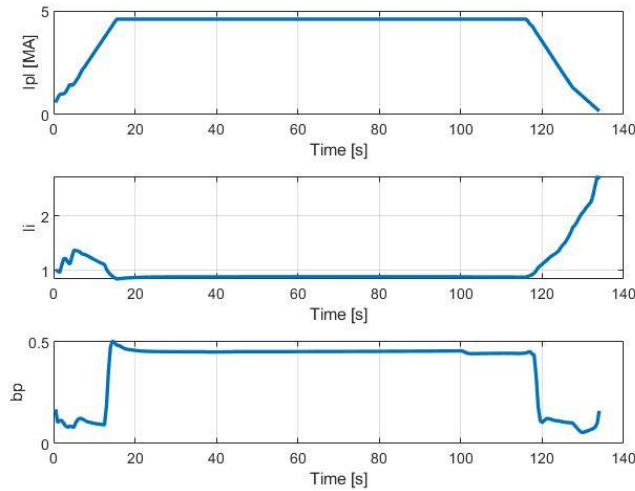
Next Steps

- Simulate the Scenario with NICE-METIS and CREATE controllers
- Introduce kinetic controllers
- Other scenarios to be studied
- Training and user interfaces

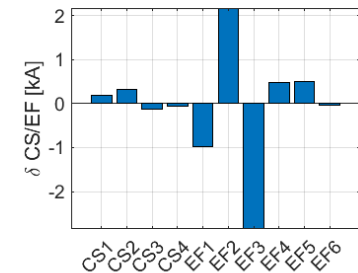
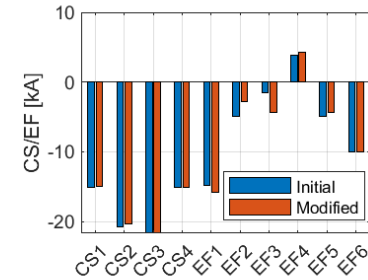
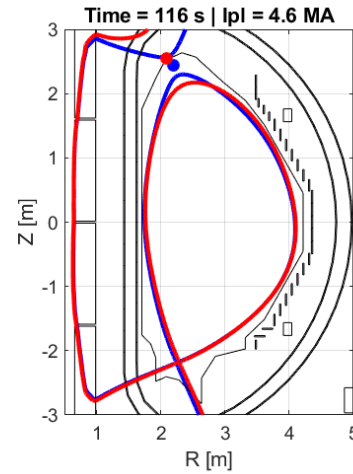
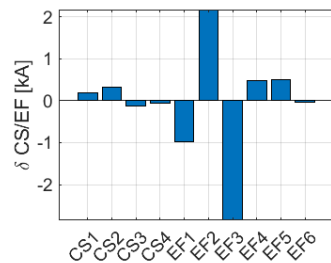
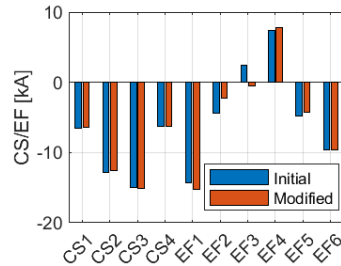
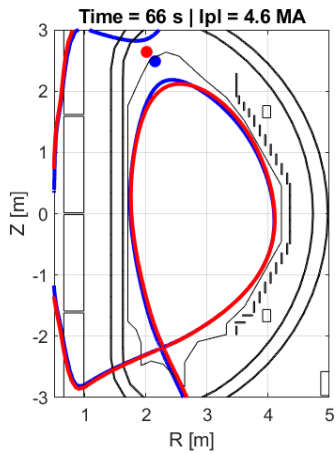
4.6 MA Deuterium Scenario

Additional Slides

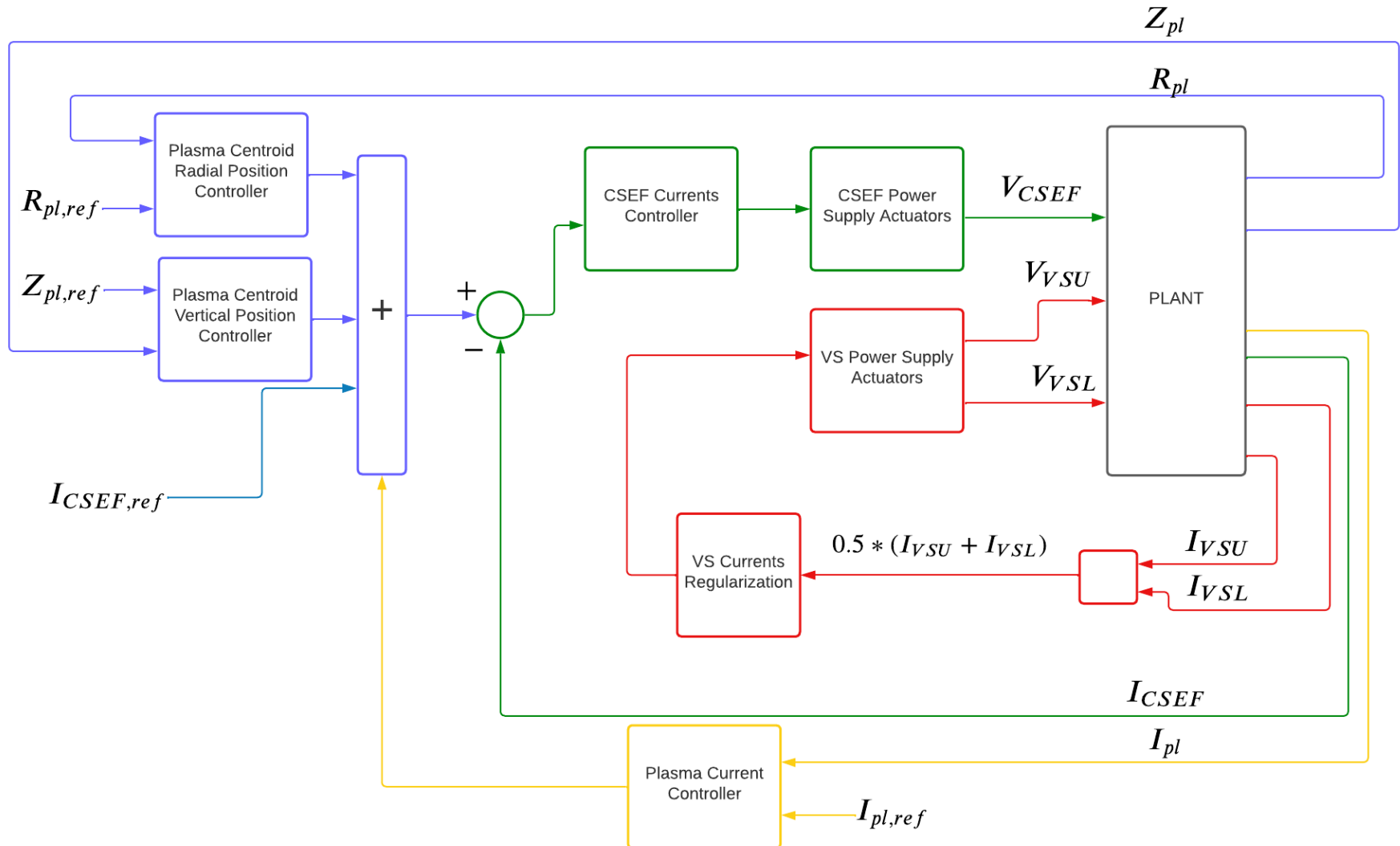
NICE-METIS



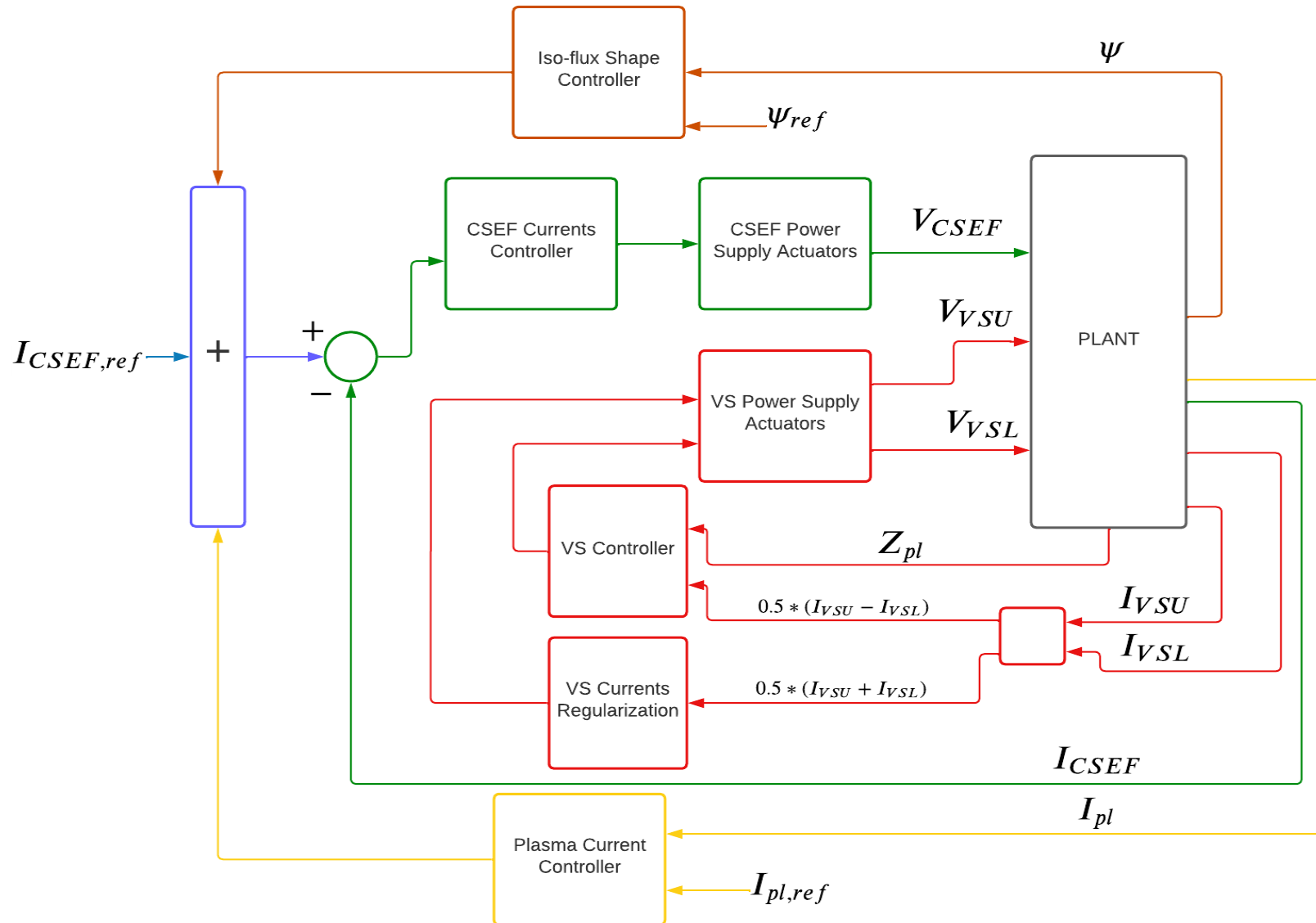
Equilibrium refinement (EGENE)



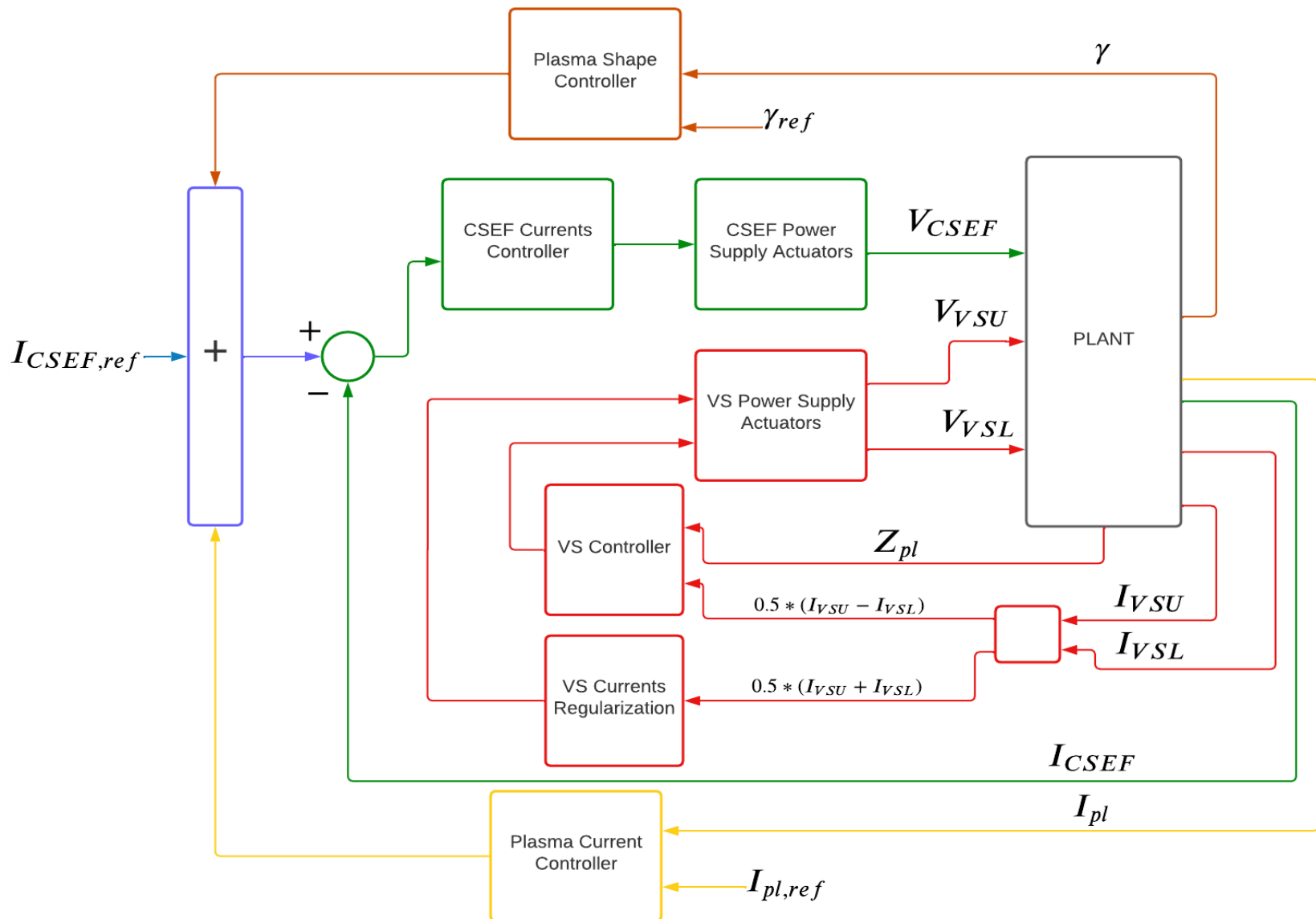
MAGNETIC CONTROL EARLY RAMPUP



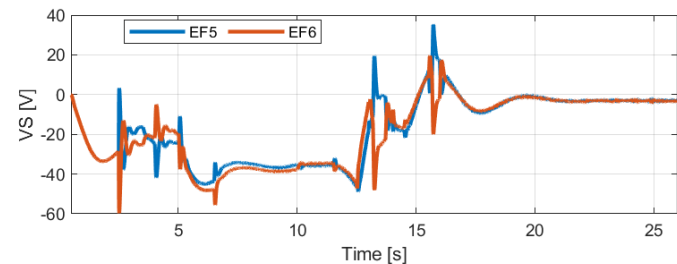
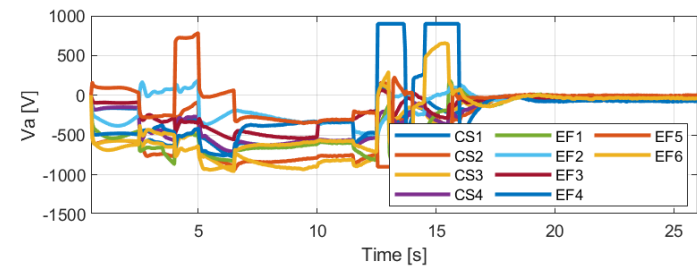
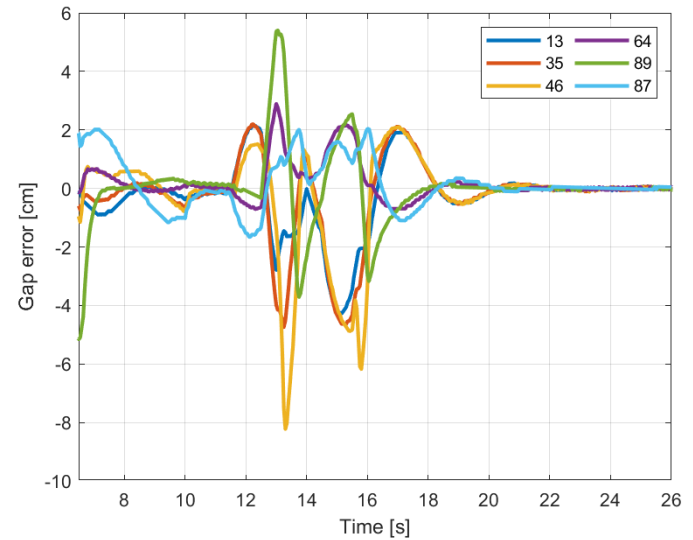
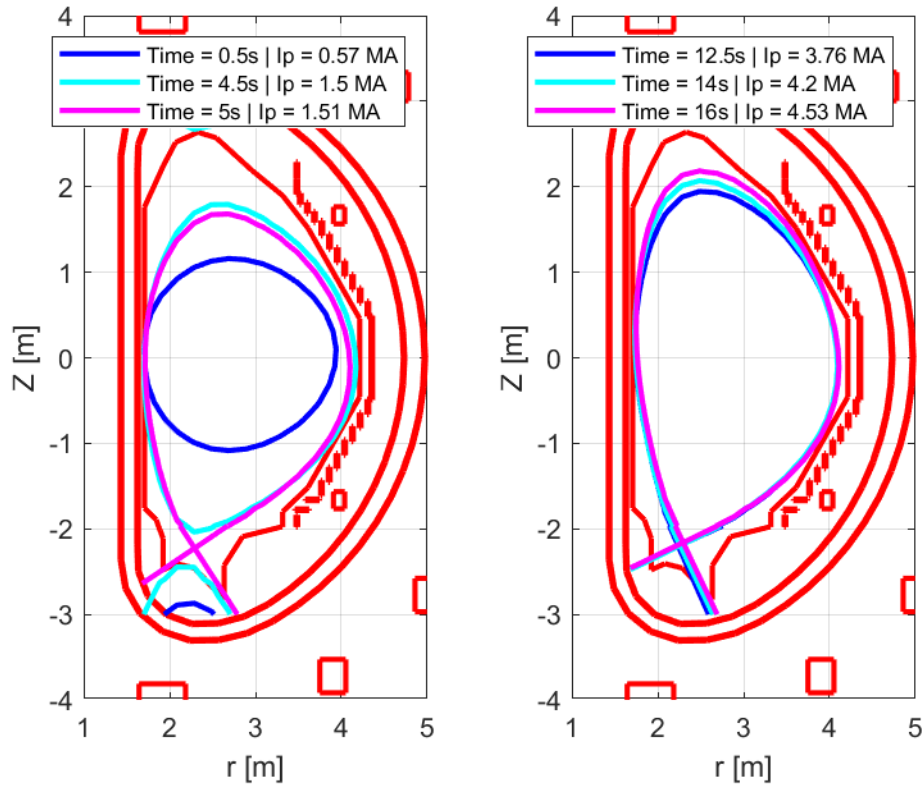
MAGNETIC CONTROL X-Point FORMATION



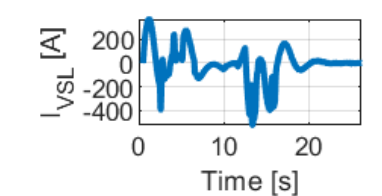
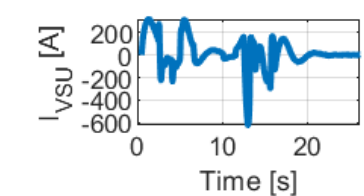
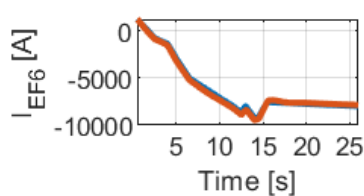
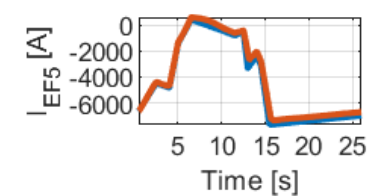
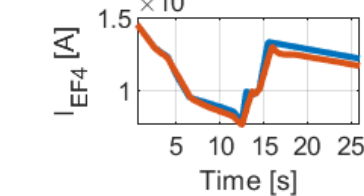
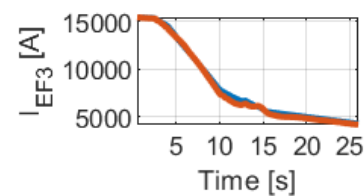
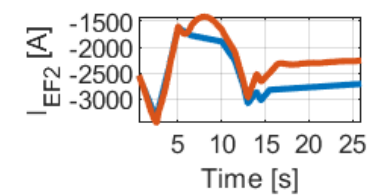
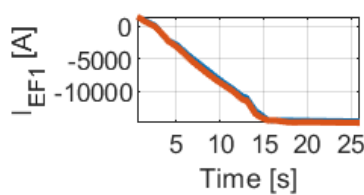
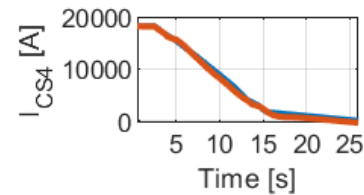
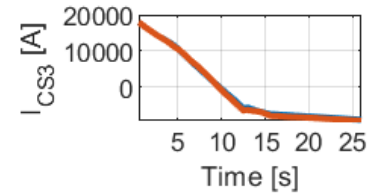
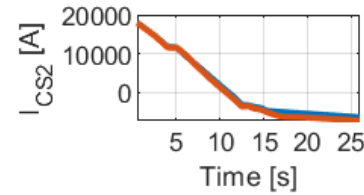
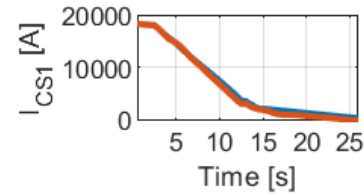
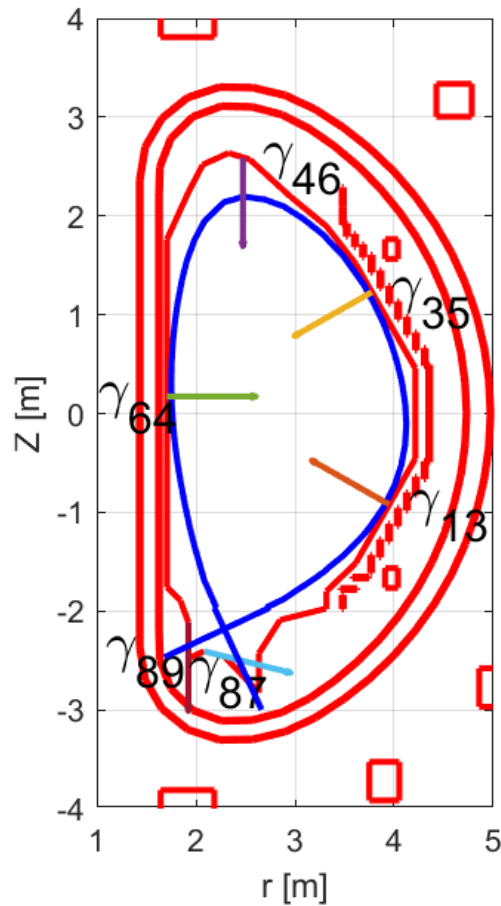
MAGNETIC CONTROL DIVERTED PLASMA



RAMPUP SIMULATION



RAMPUP SIMULATION



RAMPDOWN SIMULATION

