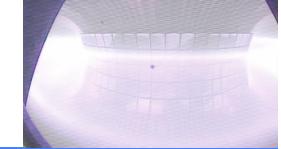


F17 – TM stab EC sweeping



Goals

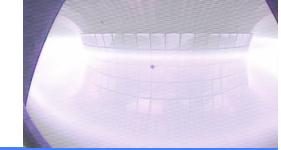
The main aims of this experiment are :

- optimise strategy for TM stabilisation by EC sweeping
- Investigate use of EC sweeping under preemptive and locked mode conditions
- to see if this behavior strictly depends on the position of the $q = 2$ magnetic surface and/or on the presence of saw-tooth activity

Scenario

- standard pre-filling pressure to avoid runaway electrons generation
- **pellet injection** at $t = 0.45$ s to eliminate the sawtooth activity
- **density ramp-down** to induce the onset of a Tearing Mode
- **trigger on a saddle signal** (after $t = 0.60$ s) to inject ECWs in presence of a high amplitude magnetic island.
- **trigger at predefined times** (after $t = 0.85$ s or at $t=0.5$ s) to inject ECWs in presence of a locked magnetic island, and before trigger of a magnetic Island.

F17 – TM stab EC sweeping



Requirements

| | |
|---|------------------|
| Toroidal magnetic field BT (T): | 5.3 |
| Plasma current Ip (MA): | 0.50 |
| Electron density n_e (10^{20} m^{-3}) | 0.2 – 0.6 |
| ECRH (MW): | 0.4 – 0.8 |

Diagnostics

Electron density and temperature profiles, D α

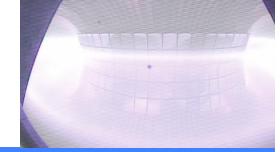
Mirnov coils, Soft-X tomography

ECpfast adjustment, Pellet injection, ECRH

Modeling

JETTO, MARS (offline)

Summary of C1 results



Goals

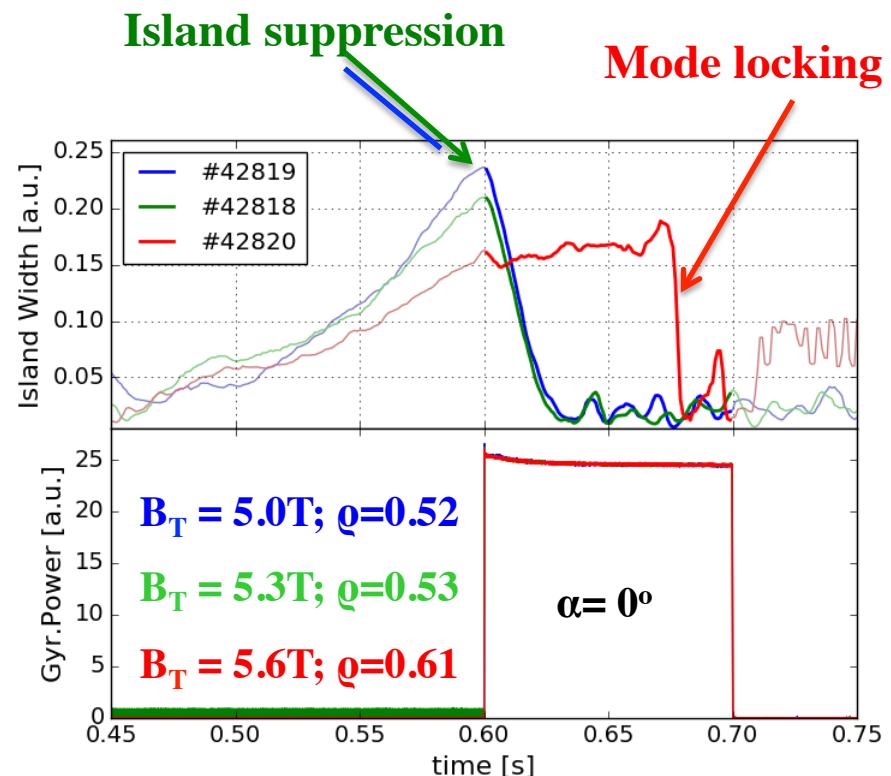
To study the effect of ECH deposition with a sweeping strategy on the temporal evolution of a magnetic island.

Scenario

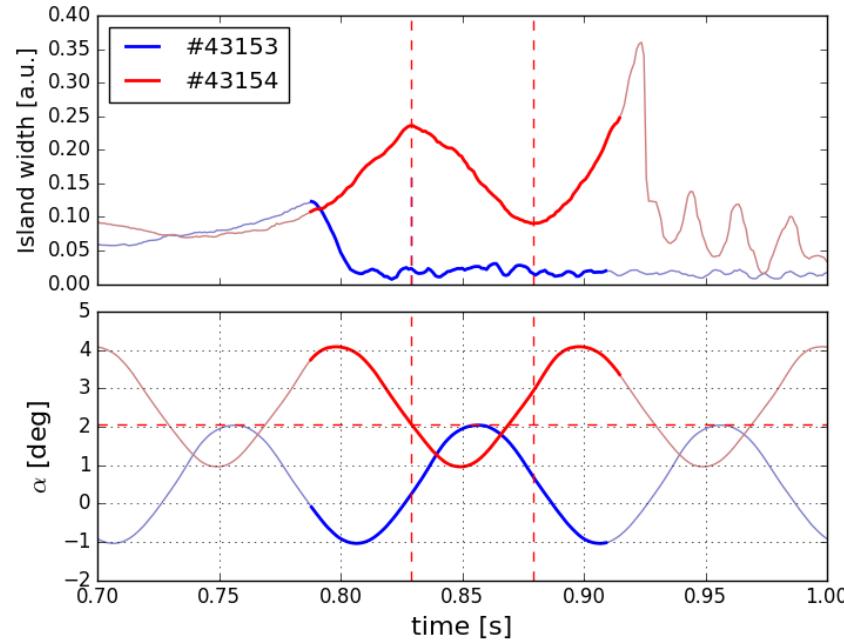
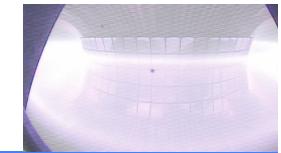
- In **saw-tooth free low density pulses**, magnetic islands formed by tearing instabilities around the $q=2$ surface can saturate at large amplitudes.
- First experiments at fixed angle provide reference to compare spatial resolution and time for Island suppression.

With a ~ 2 cm misalignment, effects change from suppression in ~ 30 ms to partial control not sufficient to avoid mode locking.

Experiments with fixed angle



Summary of C1 results

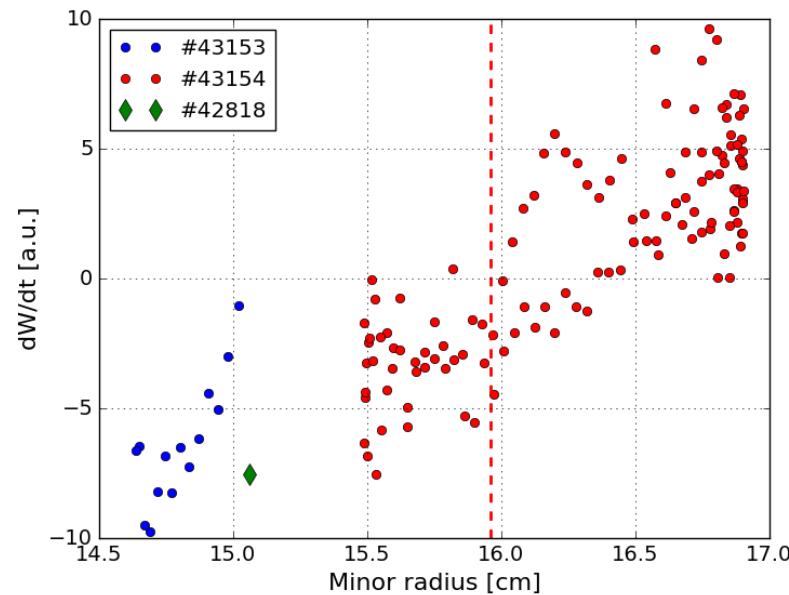


- Comparison of effects on Island width between fixed angle vs sweeping.
- It looks as with sweeping one can compensate uncertainty on Island position and also obtain more effective suppression with respect to the case of fixed launching angle.

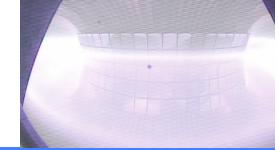
Experiments sweeping ECH deposition in RT

Scenario

- In **saw-tooth free low density pulses**, magnetic islands are induced by pellet injection (at 0.45s) - $B_T = 5.3\text{T}$.
- Two experiments varying ECH deposition within the Island (43153, suppression in $\sim 20\text{ms}$) and slightly outward (43154, partial control).



F17 – TM stab EC sweeping



Pulse Plan

| | |
|-------|--|
| 0. | Zero at 5.3T |
| 1. | 5.3 T / 500 kA / ne20: 0.5 (pellet injection) -> TM ? |
| 2. | Reference + Gy4 Fb from Saddle. Complete scan at low velocity: Lower Launcher oscillating from -4 to -1 deg (period 100ms). Repeat if necessary, changing launcher starting point. |
| 3-6. | Scan in deposition and velocity with an increased area swept (6deg: +3 to -3 or +5 to -1deg; 100-200ms; 8deg: +2 to -6, 150ms) |
| 7-8. | Deposition and velocity scan from 0.85s on locked mode, but Gy4 no more in Fb |
| 9-10. | Repeat 7-8. but before mode onset ~0.5s- (Preemptive) |