Experimental Studies of the Plasma Response to Applied Nonaxisymmetric External Magnetic Perturbations in EXTRAP T2R

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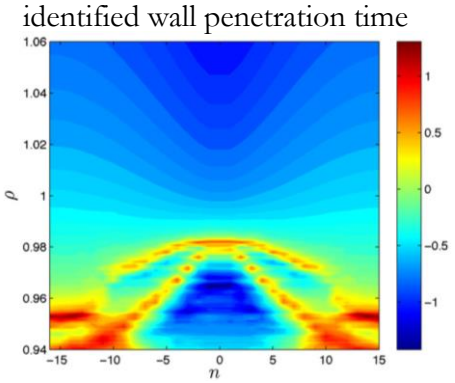
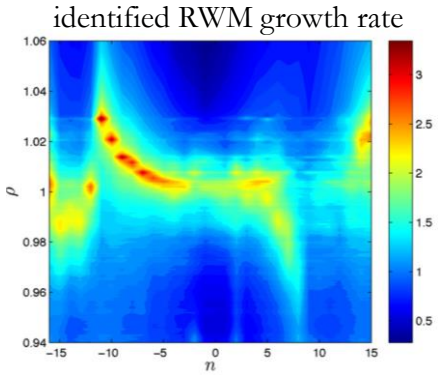
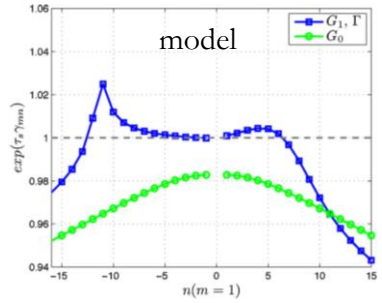
System identification for RWM control

- The experimental technique excites a set of space and time harmonics and measures the vacuum and the plasma response (dither injection).
- For a marginally stable or unstable system, the identification must be performed in closed-loop operation, in parallel with feedback stabilization.
- The dither injection technique coupled to feedback control of multiple unstable RWMs has been tested in EXTRAP T2R with satisfactory results.







Experimental study of braking torque produced by magnetic perturbations

The EXTRAP T2R control coils are used for applying external non-axisymmetric, nearly single harmonic magnetic fields which are either resonant (RMP) or non-resonant.

- Both RMPs and non-resonant magnetic perturbations produce plasma flow braking.
- Experimental estimation of the braking torque show that:
  - RMP torque is localized at the resonance surface
  - non-resonant perturbation torque is global, qualitatively in agreement with NTV theory