ELM control optimization with EFCCs

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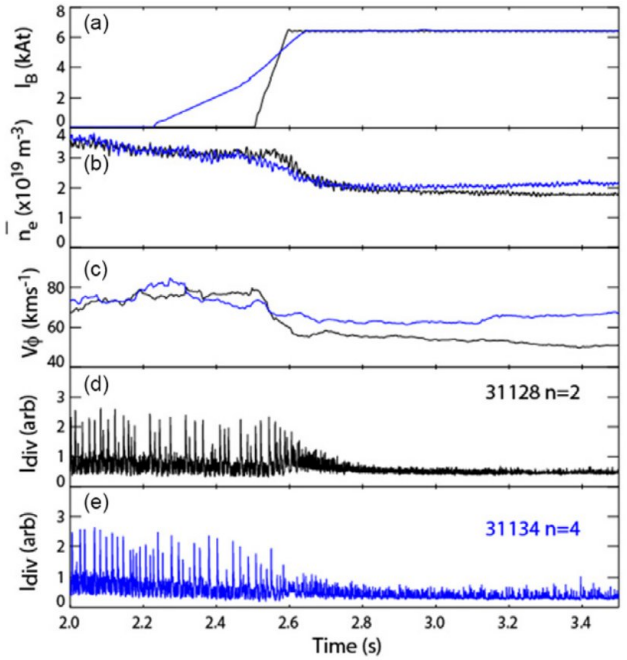
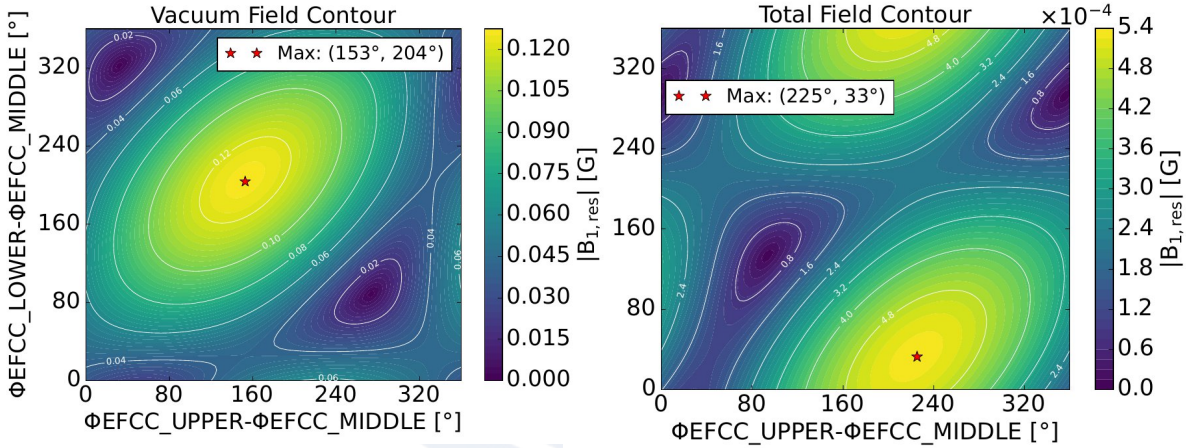
- **Scientific Background & Objectives**
  - **Successfully achieving ELM control (mitigation or suppression) is a priority topic for OP3 and it could be potentially tried also during OP2**
    - Critical to develop strategies to be extrapolated toward ITER and DEMO plasmas [1]
    - The advised strategy for ELM control in JT-60SA exploits the 3D fields generated by the EFCCs coils [2]
  - **Demonstrate ELM mitigation/suppression**
    - Achieve ELM mitigation in baseline and hybrid scenarios
    - Assess best operational operational regime for ELM suppression (density threshold, q_{95} window)
    - Study profiles evolution during RMPs application (toroidal torques, density pump-out..)
  - **Optimize ELM control strategy following the 'minimal cost criterion'**
    - Optimize access to ELM control regimes employing the least amount of EFCCs and of actuator current
    - Validate studies of plasma response and linear metrics computation performed with MHD codes (ex. MARS-Q)



Example of RMP ELM suppression in AUG

Adapted from [3]

Linear optimization with MARS-Q



Plasma response

[1] Loarte, A., et al. (2010). IAEA Fusion Energy Conf. Book of Abstracts. http://www-pub.iaea.org/MTCD/Meetings/PDFplus/2010/cn180/cn180_BookOfAbstracts.pdf

[2] Kawashima, H, et al. JT-60SA Research Plan. 2018. https://www.jt60sa.org/wp/wp-content/uploads/2021/02/JT-60SA_Res_Plan-5.pdf

[3] Kirk, A., W. Suttrop, et al. *Nuclear Fusion* 55, (2015). https://doi.org/10.1088/0029-5515/55/4/043011