

## P2.1019 Effect of applied resonant magnetic perturbations on local plasma current density gradient and stability of $m/n=2/1$ magnetic island

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See full abstract here

<http://ocs.ciemat.es/EPS2019ABS/pdf/P2.1019.pdf>

The effect of externally applied resonant magnetic perturbations (RMPs) on the plasma current density gradient in the vicinity of resonant surfaces is investigated, based on two-fluid equations. In our paper we focus on  $m/n=4/2$  or  $6/3$  RMPs. RMPs of moderate amplitude ( $\sim 10^{-4}$  -  $10^{-3}$  of the toroidal field) are found to be able to generate a significant change in the local  $m/n=0/0$  component plasma current density gradient around the  $q=2$  resonant surface, in addition to small  $4/2$  or  $6/3$  magnetic islands. The changes in the current density profile affect the stability of  $2/1$  magnetic islands. As an example we show that the growth of a  $2/1$  NTM, driven by both an unfavorable plasma current density profile and a bootstrap current perturbation, can be suppressed by a static RMP. Without applying RMPs, the NTM saturates at a width of  $0.2a$  ( $a$  is the plasma minor radius). The  $2/1$  mode can be suppressed by static  $m/n=4/2$  or  $6/3$  RMPs of moderate amplitude if the local electron fluid velocity at the resonant surface is sufficiently large. The influence of other plasma parameters, such as plasma resistivity/temperature, diamagnetic drift frequency and electron inertia, are also studied. We find in particular that higher plasma temperatures favour the stabilizing effect of external RMPs, suggesting a possible way to improve the  $2/1$  mode stability in ITER, considering that the  $2/1$  mode is one of the major causes for disruptions in tokamak discharges.

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