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The research of plasma response to RMP on J-TEXT

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The application of RMP on tokamaks is a feasible method to control MHD instabilities such as ELMs [1] and TMs [2]. The research of plasma response to RMP is important to understand the underlying physics. The differential phase Δφ which is defined by the phase difference between the current of the top and bottom RMP coils plays an important role in the plasma response and ELM suppression [3]. The plasma responses have been studied by various methods [4-6].

Series of experiments of plasma response to RMP have been carried out on J-TEXT. A linear plasma response to RMP has been observed when the RMP field is small. The magnetic island will form in plasma when the amplitude of the RMP field exceeds a critical threshold. The amplitudes of the linear plasma response measured by high field side (HFS) magnetic probes are found varying with Δφ. The linear plasma response is also affected by the ECRH and edge safety factor (q_a).

A method based on the RMP spectrum is presented to extract the plasma response. Owing to q_a=3.3 and the toroidal number of RMP is 1, we consider that there are only 3 linear plasma responses: m/n=1/1, 2/1, 3/1 (m and n are the poloidal and toroidal number). The plasma response to 1/1, 2/1, 3/1 RMP components are obtained by solving the linear response matrix equation under the assumption. The result shows that this plasma responses to 2/1 and 3/1 RMP components dominate at HFS. The result with ECRH deposited in the plasma suggests that the ECRH enhances the response and has more effect on the closest resonant surface from the ECRH depositing location.

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References

The references related to your talks will be used to write summary paper in RMPP (Rev. Mod. Plasma Phys.). So do not miss important papers related to your talk.

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