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14.26 The impacts of RMP coils on the magnetic measure and application in the control of plasma position in J-TEXT

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RMP (Resonant Magnetic Perturbation) coils are equipped to study the plasma response to the external magnetic perturbation in tokamaks. In J-TEXT, the static RMP coils have significant impacts on the probes which measure the low frequency signal, such as the locked mode sensor and displacement probes. The contribution on the probes of the RMP coils has been investigated so as to get the error magnetic field away. Besides, as for the displacement probe, which is used to control the real-time position of the plasma, a real-time PID strategy has been come up for the compensation of the RMP field influence. In the alternating-current operation of the RMP coils, the contribution from the eddy current become remarkable. The amplitude decay and phase delay of the RMP coils field have been measured in the vacuum, to decouple the measured magnetic signals from the RMP error. In particular, the pulse current was applied in the RMP coils for the feedback control of the tearing mode. And its magnetic response was combined with the alternating component and the direct component. By the cross check of the finite element analysis and experimental tests, a model from the initial flux establish to the stable status towards the pulse current has been built, and applied for error elimination.

Primary author(s) :   HUANG, Zhuo (International Joint Research Laboratory of Magnetic Confinement Fusion and Plasma Physics, Huazhong University of Science and Technology)

Co-author(s) :   DING, Yonghua (International Joint Research Laboratory of Magnetic Confinement Fusion and Plasma Physics, Huazhong University of Science and Technology); WANG, Nengchao (International Joint Research Laboratory of Magnetic Confinement Fusion and Plasma Physics, Huazhong University of Science and Technology); RAO, Bo (International Joint Research Laboratory of Magnetic Confinement Fusion and Plasma Physics, Huazhong University of Science and Technology); LI, Da (International Joint Research Laboratory of Magnetic Confinement Fusion and Plasma Physics, Huazhong University of Science and Technology); LI, Mao (International Joint Research Laboratory of Magnetic Confinement Fusion and Plasma Physics, Huazhong University of Science and Technology)

Presenter(s) :   HUANG, Zhuo (International Joint Research Laboratory of Magnetic Confinement Fusion and Plasma Physics, Huazhong University of Science and Technology); DING, Yonghua (International Joint Research Laboratory of Magnetic Confinement Fusion and Plasma Physics, Huazhong University of Science and Technology); WANG, Nengchao (International Joint Research Laboratory of Magnetic Confinement Fusion and Plasma Physics, Huazhong University of Science and Technology); RAO, Bo (International Joint Research Laboratory of Magnetic Confinement Fusion and Plasma Physics, Huazhong University of Science and Technology); LI, Da (International Joint Research Laboratory of Magnetic Confinement Fusion and Plasma Physics, Huazhong University of Science and Technology); LI, Mao (International Joint Research Laboratory of Magnetic Confinement Fusion and Plasma Physics, Huazhong University of Science and Technology)