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Study of electromagnetic effects induced by huge plasma current variations for EAST CS coils quench detection

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The quench detection for EAST superconducting CS coils is considered the most difficult quench detection work because of pulsed operation and the strong coupling with pulsed coils and huge plasma current. The coupling coefficient between superconductor and plasma is not fixed unlike the coupling with pulsed coils because the plasma current configuration is constantly changing. It lead to false quench triggers in case of big disruption due to ignore it in the original compensation system design which means a real challenge. In order to discriminate inductive voltage induced by huge plasma current more thoroughly, the active plasma noise compensation system (APC) has been studied and developed on EAST tokamak. Due to the inductance between the plasma and the CS coils is time-varying with different plasma shape and density distribution, the main task of the APC is to get the dynamic compensation coefficient by calculating the time-varying inductance quickly and efficiently.

In the past few months, calculations and studies, taking different parameters (plasma shape, density distribution, fast plasma events etc.) into consideration, have improved voltage compensation greatly.

Eligible for student paper award?

Yes

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