# A Method for Diagnosis of Current in PF Magnet based on Inversion of Measured Magnetic Field

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More and more Tokamak devices have been designed and constructed to challenge the controlled fusion problem, such as ITER, J-TEXT, EAST and HL-2M. The coil systems of the Tokamak devices are usually composed of Poloidal Field (PF) coils, Toroidal Field (TF) coils and Central Solenoid (CS) coils. Among them, the PF coils play a role for adjustment of the confining magnetic field to control the fusion plasma. In order to avoid the plasma disruption, it is necessary to know the correlation of the magnetic field in vacuum vessel (VV) with the current in coils and the plasma current and to predict the current distribution of PF coils from a distribution of perturbed magnetic field due to unstable plasma current. In this paper, taking the HL-2M device as an example, a method to predict the current distribution in the PF coils from the perturbed magnetic field in VV is proposed based on inverse analysis of the magnetic field information. Firstly, based on the Biot-Savart's law, a forward code to calculate magnetic field due to currents in PF coils, TF coils and the plasma current was developed. Secondly, an inversion code to predict current distribution of PF coils from the measured magnetic field was developed based on the conjugate gradient optimization method. The validity of the proposed inversion method and the corresponding numerical codes was investigated through reconstructing PF current distributions from several groups of perturbed magnetic fields with artificial noises.

## Eligible for student paper award?

No

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