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## **Mon-Af-Po1.18-04 [61]: AC Loss Analysis on the KSTAR PF1L Coil Based on Long-Term Operation Data**

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Typical tokamak fusion device uses CS (Central Solenoid) coil to initiate plasma heating by ramping up the coil with steadily increasing current which induces the plasma inside the vacuum vessel. For the case of the KSTAR (Korea Superconducting Tokamak Advanced Research) which uses superconductor for all of its magnets, this operation brings various AC losses to the magnets including hysteresis loss, coupling current loss, and eddy current loss. Thus it is important to analyze AC losses of the superconducting magnet for its reliable operation in two main perspectives: short term quench prevention and long term steady-operation. With 10 years of operation, KSTAR has provided many invaluable data in superconducting magnet operation regarding AC loss issues. This paper focuses on the AC loss of the KSATR PF (Poloidal Field) coil based on the long term operation data. Among the components of the PF coils, PF1L coil contributes to CS coil operation from which it experiences the highest field, and consequently the largest loss. First, numerical approach will be taken to analyze quantitatively each AC loss. Then the losses will be compared with the total loss measured by the calorimetric method. Finally, the results will be interpreted in qualitative manner to investigate the possible relation between the AC loss and the magnet's performance in persistent operation.

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