

Voltage enhancement of the dc power supplies for dynamic current control of LHD superconducting coils

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The fundamental operation of the helical-type reactor is performed under the dc magnetic field, but in some situations such as start up of excitation, dynamic control of magnetic field will be required. With similar reason, the LHD operation requires dynamic control of magnetic field, and the output voltage of power supplies are enhanced using additional pulse power supplies for this purpose. This paper introduces the enhanced power supplies for the LHD superconducting coils.

To design the pulse power supplies for the LHD, the required voltages to dynamic magnetic axis control are calculated. As the result, it was shown that the output voltage of the power supplies for IS and IV coils are bottle neck and we decided to reinforce these power supplies with construction the additional power supplies.

Figure 1 shows the circuit diagram of the IV power supply. In the figure, dc power supply shows the current power supply and the pulse power supply means the additional one.

Because of the limitation of the operating current and time of the pulse power supply, two bypass switches are connected. For the steady state operation, DS 6 is turned on, the coil is excited by the dc power supply and the pulse power supply stand-by for operation. When the high voltage is required, DS 6 is turned off then the pulse power supply is connected in series and the coil current flows through the pulse power supply. The exchange time is less than 1 s and is enough short for the plasma experiment.

The operation test of the pulse power supplies using dummy load was finished, and the test operation result using the actual

superconducting coils will be introduced in the conference.

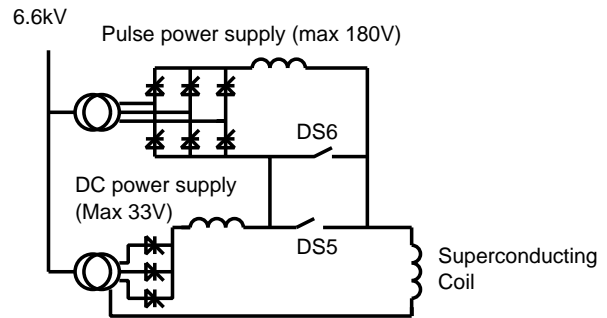


Figure 1: Circuit diagram of the power supply for IV coil.

[1] H.Chikaraishi, S.Takami, T.Inoue, T.Ise, H.Niwa, T.Haga: "Control System of DC Power Supplies for LHD Superconducting Coils", Fusion Engineering and Design, (2008) 04 vol.83 no.2-3 pp.260-264