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8.18 Low noise fast response power supply of coil for high current modulation

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High current modulations are widely required in tokamaks to generate specific magnetic field for plasma confinement, which are challenges for power electronics. For high current modulation, the stray inductance will cause high noise and surge voltage that may damage the power electronics. In addition, it is difficult to ensure both a fast response and a steady evolution. In this paper, a power supply based on insulated gate bipolar transistors (IGBTs) for high current modulation is described. The first stage capacitor bank of higher voltage ensures the current growth rate at the beginning of discharge and plays a role of wave filter later to reduce the noise. The second stage capacitor bank of lower voltage provides the main energy required in discharge. A microcontroller is used to modulate the current by feedback. This power supply can modulate the high current in a coil with low noise and fast response, which has been applied to the poloidal field control and ultrafast reciprocating probe system in SUNIST spherical tokamak.

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