

A High Power Test Method for Pattern Magnet Power Supplies with Capacitor Banks

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Due to increasing size and superior performance of synchrotron accelerators, power and performance of magnet power supplies become higher and higher. However, there are few environments where such large power supplies can be sufficiently tested because they require huge power facilities. As a result, the tests at smaller power than rated one are done in factories and rated power tests are not performed until the power supplies are installed on site. This means that the rated power test can be done only when the beam operation is stopped. In such case, it is not uncommon that the test is not sufficiently done and the problems emerge after the beam operation is started.

We suggest a test method using two capacitor banks for the power supply test. As shown in Figure 1, two choppers and small inductive load are connected between two capacitor banks in this method. By controlling the energy flow to go and return between the two capacitor banks in this setup, the received power and inductive load can be very small.

Although such small received power and load are large advantage, one disadvantage is that large capacitor bank is needed. However, J-PARC MR needs to test bank capacitors as well as the power supplies because J-PARC MR considers using bank capacitors for the energy storage as the upgrade plan. Therefore, the suggested test method is considered as the system test of the power supplies equipped with capacitor energy storage.

In this poster, the details of this test method such as the experimental setup and control scheme and so on are presented. In addition, we plan to perform the demonstration of this method using the prototype power supply for J-PARC MR main magnets. The result of the demonstration is also presented.

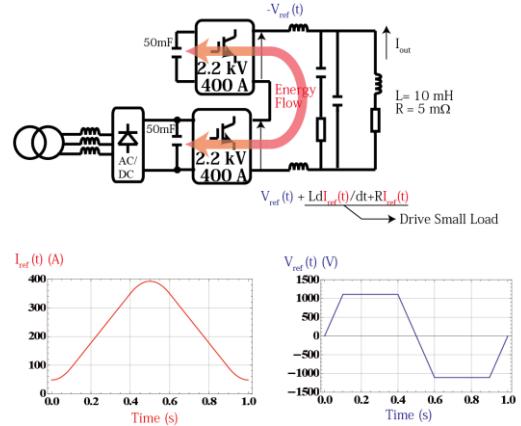


Figure 1: Experimental setup of the suggested test method. The output current and voltage of choppers are also shown.