

A flipping coil field measurement system for the

CSNS/RCS dipole magnet

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Abstract:

The Chinese Spallation Neutron Source (CSNS) is a high intensity beam facility under construction in China. Its accelerator system consists of an 80MeV linac, a 1.6GeV rapid cycling synchrotron (RCS) and two beam transport lines. The main dipole of CSNS/RCS is excited by a 25 Hz current with DC biased sinusoidal waveform. A flipping coil field measurement system has been developed to measure the whole dynamic characteristics and the consistence of the total 24 dipoles. The system consists of a long straight coil constructed with enameled copper wire, a DSA card to acquire dynamic signals, a four-axis motion controller card to control two stepper motors and one servo motor, and an embedded controller. All the hardware is based on the PXI bus modules of National Instruments. An external high precision timing signal is given to both the power supply and the acquisition card, as a synchronizing signal. The integral flux can be measured on static mode and dynamic mode. Besides the DC field characteristics, the dynamic properties of the prototype dipole such as the time dependent field harmonics, the field delay time and the nonlinear property are studied. The details of the system and some preliminary measurement results will be given.

Index terms: Dynamic characteristic, harmonic components, flip coil, magnetic field measurement