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Transient Simulation and Field Measurement of Trim Quadrupoles and AC Sextupoles for CSNS/RCS Upgrade

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In September 2018, China Spallation Neutron Source (CSNS) passed the national acceptance and started stable operation. Many scientific achievements have been made, but more and more experiments require accelerators with higher beam quality. Based on the current Lattice layout and further research, an alternative upgrade plan is proposed for RCS, which will become the formal design scheme of CSNSII after gradual improvement. As the initial start-up project of CSNSII, the trim quadrupole magnet and the AC sextupole magnet will be developed first. Both types of magnets are pulse AC magnets, and the number is 16 respectively. The trim quadrupole magnet and the main quadrupole magnet with the same aperture are putted together. Every two sextupole magnets and the main quadrupole magnet with another aperture are combined into a focusing unit. This article introduces the dynamic magnetic field simulation of the two types of magnets, fringe field interference analysis, the key technologies in fabrication, magnetic field measurements and physical effects.

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