Field Quality Control in the Superconducting Magnets for Large Particle Accelerators*, R. GUPTA, BNL - The performance of large particle accelerators depends on the field quality in the superconducting magnets. Techniques will be presented that can significantly improve the field quality. These techniques could be applied to minimize variations in the integral transfer function and field harmonics between magnets from several manufacturers or within a production run of one manufacturer. These methods have been investigated during the R&D phase of the superconducting magnets for the Relativistic Heavy Ion Collider (RHIC) and the Superconducting Super Collider (SSC). Several of them have been successfully applied in the production phase of RHIC magnets. As an application, the expected harmonics in the 50 mm aperture SSC dipoles will be presented. These new values are significantly improved over those previously estimated and used in the beam tracking studies of SSC. The reduction comes from (a) the use of the above methods for controlling field quality and (b) the use of revised methods for estimating field errors, which then agree more with the measured harmonics in RHIC and SSC dipoles.

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