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Measurement of Electromagnets and Tuning of Permanent Magnets based on Rotating Coils for the Upgrade of the Swiss Light Source (SLS2)

The upgrade of the Swiss Light Source (SLS2) has been one of the major projects at the Paul Scherrer Institute (PSI) during the last years. One key element to provide higher photon flux and brilliance for the beamline users is the extremely dense lattice arrangement with a total of 888 electromagnets and 450 permanent magnets, all designed and measured at PSI.
This contribution focuses on the measurement series conducted with a rotating coil measurement system designed and manufactured in collaboration with Elettra Synchrotron Trieste. The system consists of 5 radial coils having each 120 turns, a reference radius of 18 mm and an active coil length of 500 mm, which allows the digital bucking of dipole and quadrupole field components. With a 1-σ repeatability < 0.05 %, this measurement system has allowed us to determine the transfer function (for electromagnets), the main field (for permanent magnets), the harmonics, the roll angle and roughly the magnetic axis. The first part will focus on the measurement of the SLS2-electromagnets, detailing the measurement procedure and showing exemplary results of the Sextupoles, combined function Octupole-Normal Quadrupole-Skew Quadrupoles and the combined horizontal and vertical Correctors. In the second part, the measurement, tuning and fiducialization of the Quadrupole-SLS2-Permanent magnets of type AN, ANM and VE will be explained, and exemplary results will be shown.

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