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Study of a Sextupole Round Coil Superferric Magnet

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The LASA Lab. (INFN, Milan) is developing a new type of superferric magnets suitable to arbitrary multipole order which we refer to as Round Coil Superferric Magnets (RCSM). It is based by the previous proposal of I. F. Malyshev and V. Kashikhin. This type of magnets is suitable for strain-sensitive superconductors, because it only uses a single round coil, which has a large bending radius, to create the magnetic field. The round yoke with arbitrary multipoles is able to create the desired harmonic component for the magnet. A preliminary electromagnetic design of such magnet in sextupole configuration was presented, using MgB2 superconducting tape for the coil. In this paper we present the advances in study for the construction of the prototype. We analyze the electromagnetic properties of the coil and of the round multipole iron yoke, focusing on the optimization of the principal multipole harmonic desired. We also study the mechanic and the protection for quench, considering a new type of MgB2 superconducting cable for the coils.

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