



MT 26
International Conference
on Magnet Technology
Vancouver, Canada | 2019

Contribution ID: 1097

Type: **Poster Presentation**

Wed-Af-Po3.20-06 [59]: A Transducer for Measuring the Field Quality in Superconducting Solenoids

Wednesday, 25 September 2019 14:00 (2 hours)

At CERN the critical current of superconducting wires is measured in four test stations that use high-field superconducting solenoid magnets achieving up to 15 T. The reduction of the measurement uncertainty requires the field mapping of the solenoids in their operating condition. This paper presents the design, manufacture, and application of solenoidal-field transducers based on nested pairs of induction coils, which are moved along the axis of the magnet. The system yields an accurate measurement of the average longitudinal and transverse field components as a function of the sensor's longitudinal position. The radial dependence of the magnetic field can be estimated directly from the nested coils of different diameters or indirectly by applying the theory of pseudo-multipoles in solenoidal magnets. In this way, the transducer can be validated and the error estimation for the field measurement can be derived. The results of the magnetic measurements are finally presented and discussed.

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Session Classification: Wed-Af-Po3.20 - CCT Magnets and Field Quality of Accelerator Magnets