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Design and Characteristics Analysis of a Laboratory Electromagnet applying HTS Coils

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In this paper, a laboratory electromagnet utilizing high temperature superconducting (HTS) coils is designed and analyzed. The laboratory electromagnet is applied to excitate high magnetic fields compared with the conventional laboratory electromagnet with copper coils. The proposed electromagnet was composed of iron-core, HTS coils, and cryostat for the HTS coils. The components are designed using numerical calculation and finite element analysis. The electromagnet is based around a compact iron-core with HTS double pancake coils, and the electromagnetic design is carried out to take into account magnetic properties of the iron-core material and the I_c -B performance of the HTS conductor. Based on the design results, characteristics of the laboratory HTS electromagnet are analyzed.

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