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Dynamics of magnetic flux during CC-tapes local magnetization

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We are presenting a detailed study of the magnetization of CC-tapes stacks by the flux pump method. Magnetization of a CC-tapes stack was carried out using repeated cyclical impact of a local magnetic field source. The size of the localized area of the external magnetic field was five times smaller than the size of the HTSC sample.
A commercially available 12 mm wide CC-tape from SuperOx was used for the measurements. The tape was cut into 12 × 12 mm pieces and assembled in stacks of various thicknesses. Also, more complex stack configurations were considered, in which part of the tapes has one or two cuts. A permanent magnet (2x2x2 mm) and a solenoid (inner diameter 2 mm) were used as the source of the local magnetic field.
The influence of the thickness and configuration of the stacks on the dynamics of magnetic flux penetration and the maximum trapped flux was investigated. To study the dynamics of magnetic flux penetration, the magnetic field distribution on the sample upper surface was measured using a Hall sensor after each magnetization cycle. The analysis of the results was carried out on the basis of numerical simulation of the distribution of the trapped magnetic flux by the finite element method. The calculation results are in good agreement with the experimental data. It is shown that repeated cyclic action of a local external field leads to the accumulation of the total magnetic moment in the sample. The results obtained make it possible to optimize the magnetization regime of a CC-tapes stack, as well as to achieve the maximum magnetization of the sample and the maximum levitation force.
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Primary authors: ANASTASIIA, Diadechko (National Research Nuclear University MEPhI); POKROVSKII, Sergei (National Research Nuclear University MEPhI); OSIPOV, Maxim (NRNU MEPhI); ANISHENKO, Irina (National Research Nuclear University MEPhI); Mr STARIKOVSKII, Alexandr (National Research Nuclear University MEPhI); ABIN, Dmitry (National Research Nuclear University MEPhI (Moscow Engineering Physics Institute)); RUDNEV, Igor (National Research Nuclear University MEPhI (Moscow Engineering Physics Institute))

Presenter: ANASTASIIA, Diadechko (National Research Nuclear University MEPhI)

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