COMPUTER SIMULATION IN AN INTEGRAL FORMULATION OF THE MAGNETOSTATIC PROBLEM FOR QUADRUPOLE MAGNETS IN THE ACCELERATOR PROJECT FOR BIOMEDICAL RESEARCH

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In mathematical modeling of the field distribution of various magnetic systems of electrophysical installations, differential statements of the magnetostatic problem are actively used. In this paper, we consider the problem of magnetostatics in the integral formulation. The integral formulation is chosen because of the ability to perform calculations on the grid only inside the ferromagnetic core.

In this work, computer modeling in an integrated formulation for quadrupole magnets with a superconducting winding was carried out for a synchrotron accelerator project for biomedical research.

An algorithm for three-dimensional field modeling in an integral formulation is presented.

Two quadrupole magnets (QM-M lenses) with maximum magnetic field gradients of 68 and 52 T/m and an iron yoke length of 24 cm and 28 cm were studied.

The results of three-dimensional computer simulation of the distribution of the field gradient and higher field nonlinearities are presented in the form of graphs and tables.