SOME PROBLEMS OF COMPUTER MODELING OF MAGNET SYSTEMS FOR PHYSICAL SETUPS

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The significance of numerical simulation in the research of magnetic systems is determined not only known advantages of the computing experiment, but also that the measurement of a magnetic field is a labour-consuming and expensive problem. Mathematical simulation allows one to investigate those parts of the magnet's design, where the measurements of the magnetic field are extremely complicated or even impossible.

The process of mathematical simulation of magnetic systems should be divided into two big stages. At the first stage of designing a new magnetic system, one needs to have an opportunity of its fast and operative modeling with the help of software that possesses the properties of a "slide rule", namely, availability, simplicity of use and sufficient accuracy of numerical computations.

At the second stage, the configuration of the magnetic system, chosen as a basis, should be studied in more detail, i.e. it is necessary to perform more exact numerical calculus both in two-dimensional and in a three-dimensional case. For a detailed research on the properties of the magnetic systems in two- and three-dimensional cases, one should apply optimal numerical algorithms and their realization as software products.

This work gives results of numerical simulation of a superconducting magnetic focusing system. When modeling this system, an additional control was done over the condition $u(\infty) = 0$ approximation accuracy by using Richardson method.

The work presents the results of comparison of the magnetic fields calculated distribution with the perfomed measurements of the field of a modified magnet SP-40 of the physical installation MARUSYA.

This work also presents some results of a numerical analysis of the magnetic systems of the physical installation MARUSYA with the purpose of studying an opportunity of designing magnetic systems with predetermined characteristics of the magnetic field.