DEVELOPMENT OF CONDENSING MESH METHOD FOR CORNER DOMAIN AT NUMERICAL SIMULATION MAGNETIC SYSTEM

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A magnetostatic problem arises in searching for the distribution of the magnetic field generated by magnet systems of many physics research facilities, e.g., accelerators. The domain in which the boundary-value problem is solved often has a piecewise smooth boundary. In this case, numerical calculations of the problem require the consideration of the solution behavior in the corner domain. In this work we obtained the upper estimation of the magnetic field growth $H(s) \le C_0 \ln \frac{1}{r_s} + w(s)$, where C_0 is a constant, $w(s)$ is a bounded function, and r_s is the distance to the corner, is asymptotically obtained for the case of $\mu(H) \to 1$ when $H \to \infty$. We proposed a method of condensing the differential mesh near the corner domain of vacuum in case of 3-dimensional space based on this estimation.
An example of calculating a real model problem for SDP NICA in the domain containing a corner point is given**.** The obtained map of homogeneous field inside the detector is illustrated in Fig. 1. Color gradient shows the changing of magnetic induction in interval 5000 ± 5 Gs. Fig. 2 shows 1/24 of the ferromagnetic (because of symmetry) with the distribution the module of magnetic induction on the surface.

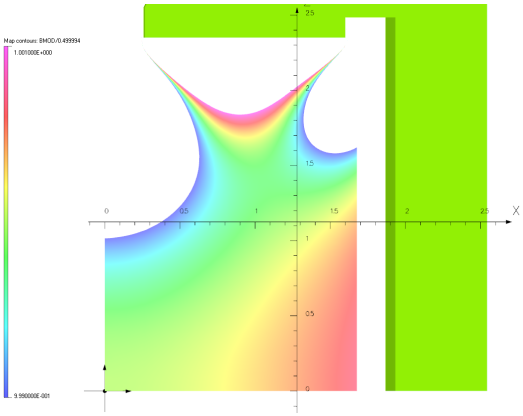

Fig. 1

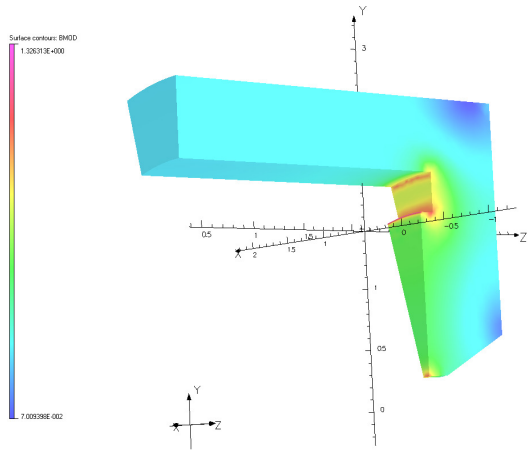

Fig. 2

References

1. E.E.Perepelkin, R.V.Polyakova, A.D.Kovalenko, P.N.Sysoev, M.B.Sadovnikova, A.A.Tarelkin, I.P. Yudin. The Boundary Value Problem for Elliptic Equation in the Corner Domain in the Numerical Simulation of Magnetic Systems, RUDN Journal of MIPh. **Vol.25, No. 3**, Pp. 253-265 (2017)
2. E.P. Zhidkov, E.E. Perepelkin. An analytical approach for Quasi-Linear Equation in Secondary Order. CMAM. **Vol. 1, No. 3**, Pp. 285-297 (2001)