MAGNETIC SYSTEM OF SPT FROM HTSC 2 TAPES [[1]](#footnote-1)\*)

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HTSC 2 tapes have broad prospects for creating magnetic systems in various fields, such as medicine (MRI), magnetic separation, energy, magnetic cooling, etc. The economic attractiveness of superconducting magnetic HTSC 2 tapes is explained by the fact that it becomes superconducting when temperature of liquid nitrogen. The SPT magnetic system consists of two inner and outer coils and a soft iron magnetic core. The optimal configuration of the magnetic field in a discharge chamber made of SPT 100 ceramics is shown in [1]. The report contains calculations of the configuration of the magnetic field in the SPT 100 for a magnetic system made of an HTSC 2 tape. The system consists of 2 coils that form a quadrupole. A larger coil is located outside the discharge chamber insulator. The second coil is located inside the discharge chamber insulator. The direction of the current in both coils is the same. The coils are located at the location of the anode in the discharge chamber. The cross section of the coil is rectangular with a height of 10 mm and a width of 8 mm. Calculations were made of the pattern of lines of force in such a magnetic system. When the current in the inner coil is 7 times greater than in the outer one, the calculated pattern practically coincides with the pattern of the lines of force in the SPT. If the current in the internal coil is 4500A, then the magnetic field increases from 0 in the anode region to 250 Gs at the motor cutoff. This also corresponds to the parameters of the field in the SPT. The value of the current in the inner coil is obtained at a current at a current of 45A and the number of turns 100. Experiments on levitation of coils from an HTSC 2 tape have shown that the indicated current value is below the critical value in a tape 4 mm wide. This number of turns is placed in a coil above the indicated dimensions. The calculations also showed the possibility of changing the gradient of the increase in the magnetic field in the discharge chamber by changing the width of the coils. The calculations have shown that in an SPT with a magnetic system made of HTSC 2 tape, a magnetic field of 1000G is attainable, which makes it possible to increase the specific impulse of the engine. The considered magnetic system also allows a significant increase in the diameter of the thruster. This makes it possible to create a 100 kW thruster. As shown in [2], replacing the traditional system of magnetic coils in iron armor with coils made of HTSC 2 tape can significantly increase the efficiency and specific impulse of the plasma thruster by increasing the magnetic field.

References

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1. \*) [abstracts of this report in Russian](http://www.fpl.gpi.ru/Zvenigorod/XLIX/Pt/ru/GB-Bishaev.docx) [↑](#footnote-ref-1)