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## SIMULATION OF A SUPERSONIC PLASMA JET WITH RECOMBINATION IN A MAGNETIC NOZZLE

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At the present time, an advanced open-ended mirror-like plasma propulsions are considered for human mission to Mars [1].

Collisional supersonic plasma jet in magnetic nozzle is considered for regime of high thrust. The plasma jet is transformed into a neutral particles flow by recombination. The exact calculations are necessary to this consideration because of recombination rate depends on plasma parameters strongly.

In this paper, plasma jet in the magnetic nozzle is considered within the framework of magnetic hydrodynamics. The hydrodynamics approximation is applicable in our conditions of necessary high density because the particle mean-free-path is less than the local scale length of the magnetic field variation. The set of equations includes the continuity, motion, and heat flux equations for both electrons and ions. Numerical code described in [2, 3] is used. This code is supplemented by contributions from 3-body recombination.

In the present work, the results of numerical calculations are presented. Main processes of the plasma jet flowing in the magnetic nozzle are discussed. Recommendations on choice of possible scenario of experiment are given.

### References

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