

## **Simulation of Plasma Plume / Space Craft Interaction.**

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In the report the systematic base of the research of the plasma plume / spacecraft interaction problems is stated. It can be divided as the next stages:

- To make the list of the found and expected effects of interactions plasma plume with space craft being based on both the experience of the EP uses and the knowledge of plasma dynamics in space and physical processes accompanying the injection of the ion beams;
- To determine the parameters that characterize that or other influence, i.e. what physical parameters of a plasma plume need to be known for the correct estimation of the expected effects, what parameters can be measured in ground tests and what parameters should be measured in flight conditions.
- To develop the theoretical and experimental models both the plasma plume dynamics and the processes of the interaction of the plasma plume with the SC surfaces and onboard equipment. The reliable model of plasma plume expansion in space allows to estimate all possible configurations of the plasma formation and their sizes. Thus the ground measurement of a plume parameters can be reduced to the minimal necessary one. Besides the plume modeling is a key for the account of the PP / SC interaction effects.
- To verify the model of the plasma exhaust by means of the comparison of the calculation results with the experimental data. The most of the ground data concerns actually the plasma plume parameters at distances from 0.1m up to 9m. The experimental data of the plasma plume parameters at distance of 10m or more meters are absent. The experimental data concerning the influence of the plasma plume on the surfaces or onboard equipment are fractional. However, if you compared the account results of all existing models with all available experimental data and made a choice of the most authentic model, you may be sure you have the reliable tool for the further analysis.
- To examine the spacecraft concept / design and the theoretical predictions of the PP/SC interaction in the space experiment.

By finishing all cycle of researches you receive the reliable tool, which allows rather precisely to predict expected effects of the influence of a plasma plume on the SC and to provide such design decisions, which allow to minimize a negative influence of the EP.

In the report the results of calculation of number PP/SC interaction effects are presented. The comparison with allowed experimental data is also conducted.

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