Title: *Dynamics of the bow shock and magnetopause*

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Abstract: *The interplanetary space is a unique laboratory which allows us to discover (i) a behavior of the plasma under different conditions, (ii) origin of its instabilities, and (iii) its interaction with obstacles such as the Earth's magnetosphere. The present thesis analyzes the outer Earth's magnetosphere. The results are based on the in situ sensing by a variety of the spacecraft (e.g., IMP-8, INTERBALL-1, MAGION-4, Geotail, Cluster-II and Themis).*

The solar wind curently monitored by the WIND and ACE spacecraft near the Lagrange point L1 affects by its dynamic pressure the Earth's magnetic field which acts as a counter-pressure and the boundary where these pressures are balanced is the magnetopause. Due to supersonic solar wind speed, the bow shock forms in front of the magnetopause and a region in between, where plasma flows around an obstacle is named the magnetosheath.

The thesis contributes to a deaper understanding of the dependence of magnetopause and bow shock shapes and positions, especially, (1) on the orientation of the interplanetary magnetic field, (2) on the orientation of the Earth's magnetic dipole, (3) a correction of the dependence on the solar wind dynamic pressure and (4) a determination of the speed of the bow shock motion. The most important result is unique authomatic method for recognition of different magnetosheric regions, which led to development of the new empirical magnetopause and bow shock models.

Keywords: *Earth's magnetosphere, bow shock, magnetopause, magnetosheath, empirical model*