Comparison of Plasma and Magnetic Overshoots of Interplanetary Shocks

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The structure of quasiperpendicular interplanetary (IP) shock fronts was studied based on the data from the BMSW plasma spectrometer, installed onboard the SPEKTR-R spacecraft, supplemented by magnetic field measurements on the WIND. Special attention was paid to periodic growths (overshoots) in the value of the ion flux relative to their mean values outside the ramp. A comparison of plasma overshoot was performed with the overshoot in the magnetic field, with the Mach number, and with the β parameter. Based on the analysis of 26 crossings of IP shocks, in which the overshoots in the ion flux and magnetic field value were observed, it was shown that the value of the magnetic field overshoot is, on the average, less than a similar value in the solar wind's ion flux, which is associated with different time resolution of measurements.

The ion flux overshoot value is found to grow with the growth of the Mach number. It is shown that overshoots are formed not only in the supercritical shocks, but also in those with Mach numbers that are less than the value of the first critical Mach number. It is also found that the estimates of the coherent downstream oscillations of the ion flux and magnetic field good correlate with the convected ion gyroradius.

This work was supported by the Russian Foundation for Basic Research, grant no. 19-02-00177.