Geophysical Research Abstracts, Vol. 9, 03020, 2007
SRef-ID: 1607-7962/gra/EGU2007-A-03020

Interplanetary Magnetic Field Calculation in 3D MHD Numerical Simulations

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Interplanetary magnetic field has been investigated by numerical solution of 3D MHD equations, using the Peresvet code. The thermal corona expansion is calculated in the dipole magnetic field corresponding to the solar activity minimum, and typical corona parameters are used as initial conditions. Plasma compression, dissipation, thermal conductivity, and gravitation are taken into account. Polarization does not appear at radial expansion of the solar corona. As a result, the sheet magnetic field is determined by the $\mathbf{V}\times\mathbf{B}$/c force. The normal magnetic field component is an important feature of the heliospheric current sheet. The sheet can not be a neutral one. Current generation is similar to action of a short closed MHD generator, but Spitzer conductivity is not available for calculation of heliospheric current sheet thickness, because the current density is restricted by the low density plasma in the solar wind. The magnetic field configuration above the poles is also calculated. The solar wind temperature is determined by plasma cooling because of plasma expansion and heat conduction from the Sun. The possibility of solar wind creation at plasma thermal expansion in magnetic field is very sensual to corona parameters. This effect is in agreement with well-known Parker solution. In the process of expansion the solar wind is accelerated and achieves the supersonic velocity at a distance of about 3 solar radii. The comparison with space measurement is presented.