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A three dimensional analysis of the flow past an open terrestrial magnetopause

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A study of the three dimensional incompressible flow of the solar wind past an open terrestrial magnetosphere is presented. The plasma is described by the MHD equations including non-ideal effects such as resistivity and viscosity. The theoretical analysis is based on an ordinary perturbation technique with expansion in orders of large Reynolds, and Lundqvist numbers. Magnetic reconnection is assumed to occur at an arbitrary line along a region of the magnetopause, stretching from the sub-solar point to the north. From the analysis we find analytical solutions describing the flow and magnetic field during the transition from the magnetosheath region to the magnetosphere region.