



## A Statistical Model of the Magnetotail Neutral Sheet

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The neutral sheet of the magnetotail is characterized by weak magnetic field, strong cross tail current, and a reversal of the magnetic field direction across it. The dynamics of the earth's magnetosphere is greatly influenced by physical processes that occur near the neutral sheet. However, the exact position of the neutral sheet is variable in time. It is therefore essential to have a reliable estimate of the average position of the neutral sheet. Magnetic field data from ten years of Cluster, nineteen years of Geotail, four years of TC 1, and seven years of THEMIS observations have been incorporated to obtain a model of the magnetotail neutral sheet. All data in aberrated GSM (Geocentric Solar Magnetospheric) coordinate system are normalized to the same solar wind pressure condition. The shape and position of the neutral sheet, illustrated directly by the separator of positive and negative  $B_x$  on the YZ cross sections, are fitted with a displaced ellipse model. It is consistent with previous studies that the neutral sheet becomes curvier in the YZ cross section when the dipole tilt increases, yet our model shows the curviest neutral sheet compared with previous models. The new model reveals a hinging distance very close to  $10 R_E$  at a reference solar wind dynamic pressure of 2 nPa. We find that the earth dipole tilt angle not only affects the neutral sheet configuration in the YZ cross section but also in the XZ cross section. The neutral sheet becomes more tilting in the XZ cross section when the dipole tilt increases. The effect of an interplanetary magnetic field (IMF) penetration is studied, and an IMF  $B_y$ -related twisting of about  $3^\circ$  is found. Anticlockwise twisting of the neutral sheet is observed, looking along the downtail direction, for a positive IMF  $B_y$ , and clockwise twisting of the neutral sheet for a negative IMF  $B_y$ .