



Case study of the structure of Mercury's magnetosphere: Comparison of three dimensional hybrid simulations with observations during MESSENGER's first Mercury flyby

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Recent results of three dimensional hybrid simulations of Mercury's magnetosphere revealed its basic structure including a bow shock, magnetopause, well pronounced cusp regions and a closed ion ring that forms around the planet within the magnetosphere. We have studied changes in the properties and structure of Mercury's magnetosphere for different solar wind parameters (plasma beta, solar wind speed). In this paper we use our model to perform a case study of Mercury's magnetosphere using the solar wind conditions of January 14, 2008 to compare with MESSENGER observations made during its first flyby of the planet. We take advantage of the three dimensional kinetic hybrid model to support the interpretation of MESSENGER's magnetic field and particle data made within Mercury's magnetosphere wherever possible.