



Generation of Birkeland Currents during IMF By: Mechanisms and theory

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We investigate the role of IMF B_y in the generation of Birkeland Currents (BC), comparing observations from AMPERE and MHD simulations. Observations have shown that the intensity and position of the aurora is not always symmetric between the two hemispheres. Asymmetric BCs arise due to non-uniform penetration of IMF B_y in to the closed magnetosphere. We investigate associated BCs, and whether asymmetric currents between the two hemispheres can be observed. We show how asymmetrical footpoints are produced, and how this may lead to asymmetrical BCs at conjugate points. We also present current measurements from AMPERE that are consistent with this picture. We argue that the induced B_y produces asymmetrical Birkeland currents as a consequence of asymmetric stress balance between the hemispheres. Such an asymmetry will also lead to asymmetrical footpoints and asymmetries in the azimuthal flow in the ionosphere. These phenomena should therefore be treated in a unified way.