The Generation of Auroral Alfven Waves

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A two dimensional global-scale hybrid code simulation in the midnight meridian plane of the magnetosphere shows that large amplitude Alfven waves of the type seen on the Polar Satellite can be generated by fast earthward flows in the plasma sheet. These fast flows are driven by the collapsing tail field associated with substorm dipolarization. The Alfven waves radiate outward long magnetic field lines from a turbulent region where the fast flows are stopped by the dipole field. Animations show the propagation of shear Alfven waves from the plasma sheet to the auroral ionosphere. These simulations provide a link between fast earthward flows and the auroral substorm expansive phase.