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Turbulent heating of magnetospheric ions in downward Birkeland current sheets JOHN JASPERSE, BAMANDAS BASU, Air Force Research Laboratory, Space Vehicles Directorate, Hanscom AFB, Massachusetts 01731, ERIC LUND, Space Science Center, University of New Hampshire, Durham, NH 03824 — A new fluid theory in the guiding-center and gyrotropic approximation derivable from the Vlasov-Maxwell equations that included the effect of wave-particle interactions for weakly turbulent, weakly inhomogeneous, non-uniformly magnetized plasma was recently given by Jasperse, Basu, Lund and Bouhram [Phys. Plasmas, July (2006)]. In that theory, the particles are transported in one spatial dimension (the distance along the magnetic field) but the turbulence is two-dimensional. In this paper, the above theory is used, together with satellite measurements of the levels of wave turbulence, to calculate the altitude profile of the perpendicular ion temperature, $T_{i\perp}$, for a downward Birkeland current sheet in the earth's magnetosphere. The ions are heated perpendicular to the geomagnetic field by cyclotron resonance with random electrostatic turbulence near the ion cyclotron frequency and its harmonics. Comparisons of the calculated $T_{i\perp}$ to satellite measurements of $T_{i\perp}$ show reasonable agreement. A new formula is also given for the altitude profile of the turbulent, perpendicular ion-heating rate per unit volume.

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