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Nonlinear interaction of electrons with oblique high-amplitude whistler waves.

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We describe a mechanism of resonant electron acceleration by oblique high-amplitude whistler waves in the Earth outer radiation belt. Angle between the wave-normal and the background magnetic field and wave amplitude of waves are determined from spacecraft observations. Oblique wave propagation at high latitudes results in appearance of parallel electric field with amplitude 10-100 mV/m. We show that due to this strong parallel electric field, the whistler waves can capture electrons into the Landau resonance. Captured electrons escape from the resonance at higher latitudes. Each capture-escape event results in an energy gain of up to 50 keV in the inhomogeneous magnetic field of the Earth dipole. We compare effectiveness of particle acceleration in Landau and first cyclotron resonance.