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Influence of the perpendicular electric field on ion beamlets in the magnetotail

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Several studies, both experimental, analytical, and numerical, show that a substantial electric field E_z perpendicular to the magnetotail current sheet can be found. This electric field has a typical bipolar structure. It was expected that E_z electric field could change condition for ions adiabatic acceleration in the magnetotail previously obtained by Buechner and Zelenyi (JGR, V.94, 1989). We are going to present analytical theory describing modification of resonant conditions under influence of E_z. A test particle simulation also has been performed to compare simulation results with analytical ones. We found that for both signs of E_z (pointing away and towards the current sheet), the beamlet energies are slightly decreased for moderate values of $|E_z|$, while the beamlets spread in energy and almost merge for larger values of $|E_z|$. But this effect is much more marked for E_z pointing towards the current sheet. In this case only one beamlet curve exists and all ion structures are overlapped. This merging appears to be related to the formation of a nonlinear potential well in the ion motion. Implications for beamlet observations are discussed.