Modeling of interchange instability in the plasma sheet

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Gold's criterion of interchange stability has been checked in the plasma sheet at tailward distance X= -16 to –60 Re. The value of pV^(5/3) was calculated along the noon-midnight meridian directly from the Fairfield database and with the use of T96 magnetic field model. This value turned out to grow downtail everywhere except the region X= -30 –50 Re where under very quiet geomagnetic conditions its gradient is directed earthward. Hence interchange structures relevant to fast magnetospheric flows and sun-aligned arcs can develop here. Other regions that may be interchange unstable are those of field-aligned currents. Though the radial gradients can be stable here with respect to Gold's criterion, in these regions according to the Vasyliunas formula should be a directional difference between the vectors grad p and grad V caused by the electric field or any other external force. The resulting interchange structures can be related to discrete auroral arcs which are known to be embedded in region 1 field-aligned currents.