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Shear flow-interchange instability in nightside magnetotail causes auroral beads as a signature of substorm onset JASON DERR, WENDELL HORTON, University of Texas at Austin, RICHARD WOLF, Rice University — A geometric wedge model of the near-earth nightside plasma sheet is used to derive a wave equation for low frequency shear flow-interchange waves which transmit $\vec{E} \times \vec{B}$ sheared zonal flows along magnetic flux tubes towards the ionosphere. Discrepancies with the wave equation result used in KAL15 for shear flow-ballooning instability are discussed. The shear flow-interchange instability appears to be responsible for substorm onset. The wedge wave equation is used to compute rough expressions for dispersion relations and local growth rates in the midnight region of the nightside magnetotail where the instability develops, forming the auroral beads characteristic of geomagnetic substorm onset. Stability analysis for the shear flow-interchange modes demonstrates that nonlinear analysis is necessary for quantitatively accurate results and determines the spatial scale on which the instability varies.

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