# Feedback instability theory extended to the magnetosphere-ionosphere coupling with field-aligned inhomogeneity

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The feedback instability theory for Alfvenic coupling of the magnetosphere and the ionosphere has been extended by introducing inhomogeneous profiles of the ionospheric collision frequency and the magnetospheric Alfven speed. The eigenvalue analysis clarifies the stabilizing mechanism of high frequency components of the ionospheric Alfven resonator (IAR) mode for the strongly inhomogeneous collision frequency profile in the ionosphere. The stabilization is brought by an effective internal resistivity due to the ionospheric inhomogeneity, not by a shear of the ionospheric current. Low frequency components of the field line resonance (FLR) mode remain unstable even when the high frequency components are stabilized. The theoretical results demonstrate a robustness of the feedback instability mechanism providing spontaneous growth of the auroral arc structure in the magnetosphere-ionosphere coupling.

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