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Spontaneous structure formation of aurora due to magnetosphere-ionosphere coupling

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Feedback instability occurs in a coupling system of the magnetosphere and the ionosphere, and is a theoretical model explaining spontaneous development of the quiet aurora. In this study, we extend a model of the magnetosphere in the feedback instability to the gyrofluid model. This extension makes it possible to properly discuss kinetic effects, such as the finite Larmor radius effect, the Landau damping, and the mirror force, on the feedback instability in a framework of a fluid model. The derived model is applied to linear stability analysis and nonlinear simulation of the feedback instability.

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