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Gyrokinetic simulation of nonlinear evolution of the mirror instability PETER PORAZIK, JAY JOHNSON, Princeton Plasma Physics Laboratory — Mirror instabilities are typically observed in compressed high beta plasma, associated with shocks in the solar wind and at planetary magnetospheres. Observations suggest that these waves regulate the temperature anisotropy in the solar wind and magnetosheath. Nonlinear structures observed in planetary magnetosheaths and magnetospheres have been associated with the late stage development of mirror instabilities. In order to understand the nonlinear evolution of the mirror instability including regulation of anisotropy and the development of nonlinear structuring known as "peaks" and "dips," we have developed a gyrokinetic simulation model. The model is implemented with a noise reducing delta-f, particle-in-cell method, and has been successfully verified against previous studies with a single unstable mode present, showing saturation due to particle trapping. Simulations of a 2D spectrum of unstable modes display formation of a saturated state with peaked magnetic structures. We discuss the physical mechanisms responsible for saturation and nonlinear development of the instability and compare the qualitative features with observations.

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