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GAM shearing feedback loop in turbulence spreading and transport bifurcation KAZUHIRO MIKI, PATRICK H. DIAMOND, Center for Astrophysics and Space Science, UCSD, ZHIHONG LIN, Department of Physics and Astronomy, University of California, Irvine — To theoretically discuss the impact of the GAM on turbulence, two synergistic processes are elucidated; zonal flow modulation and the effect of secular wave group propagation on spreading. Using wavekinetic modulational analysis, the response of turbulence to the GAM is calculated. This group speed differs from that for zero-frequency zonal flows due to resonance between drift wave group speed and the GAM strain field, which allows secularity. Finite real frequency and radial group velocity are intrinsic to the GAM, so non-local phenomena at the edge region are likely. To understand the effect of the GAM on turbulence dynamics, a predator-prey model incorporating the turbulence and the GAMs is constructed and analyzed for stability. Three possible states are identified, namely on an L-mode-like stationary, an H-mode-like stationary, and an H-mode-like oscillatory state which reproduces a regime where the GAM shearing regulates the turbulence level. The system is attracted to the state with the minimum turbulence level for the given control parameters. The Doppler-shifted GAM frequency is found as the result of the GAM radiative dissipation. This material is based upon work supported by the Department of Energy under Award Numbers DE-FG02-04ER54738 and DE-FC02-08ER54959.

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