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Non-linear interactions of magneto-Poincare and magnetostrophic waves in rotating shallow water magnetohydrodynamic
ARAKEL PETROSYAN, DMITRY KLIMACHKOV, Space Research Institute of the Russian Academy of Sciences — We have investigated the interaction of wave packets in the magnetohydrodynamic shallow water flows in external vertical magnetic field. Using the asymptotic multiscale methods we received that three magneto-Poincare waves interact, three magnetostrophic waves also interact, We obtained intermode interactions: two magnetostrophic waves and magneto-Poincare wave, two magneto-Poincare waves and magnetostrophic wave. In all cases we derived nonlinear equations of three waves interactions and showed the existence of two types of instability mechanisms: decay instabilities and parametric growth. It has been found that there are four types of decay instabilities: magneto-Poincare wave decays into two magneto-Poincare waves, magnetostrophic wave decays into two magnetostrophic waves, magneto-Poincare decays into one magnetostrophic and one magneto-Poincare wave, and magnetostrophic wave decays into one magneto-Poincare and one magnetostrophic wave. The growth rates of decay instabilities were received. Also four types of parametric growth were investigated: magneto-Poincare waves amplification, magnetostrophic waves amplification, magneto-Poincare wave growth in field of magnetostrophic wave, and magnetostrophic wave growth in field of magneto-Poincare wave.

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