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Linear generation of planetary scale fast magnetic waves in ionospheric zonal shear flows

We study the shear flow non-normality induced linear coupling of planetary scale modified Rossby waves and westward propagating fast magnetized waves using non-model approach. The performed analysis al-lows us to separate from each other different physical processes, grasp their interplay, and, by this way, construct the basic physics of the linear coupling of the slow and fast waves in an ionospheric incompressible zonal flow with linear shear of mean velocity, $U_0=(S_y,0)$. In this study, we will show that the modified Rossby waves generate fast magnetized waves due to the coupling for a quite wide range of ionospheric and shear flow parameters; the linear transient processes are highly anisotropic in wavenumber plane; the generation of the magnetized waves is most efficient for S≈0.1 (S is the shear rate normalized to the combination of the angular velocity and latitude, $\Omega_0\cos\Theta_0$); the stream-wise wave number of the optimally generated magnetized wave harmonics decreases (the length scale increases) with increasing hall parameter, α. At the end, we will discuss nonlinear consequences of the described anisotropic linear dynamics - they should lead to anisotropy of nonlinear cascade processes

Biography

Oleg Kharshiladze is associated professor at physics department of Iv. Javakhishvili Tbilisi State University. His research interests are modeling of nonlinear dynamics and chaos pro-cesses in space plasma, radiophysics, earthquakes, application of numerical methods in non-linear differential equations. He is involved in international scientific group, working on ana-lytical and numerical analysis of ionospheric and magnetospheric processes (turbulence, shear flows, BBF and others).

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