

# **GENERATION AND MUTUAL TRANSFORMATION OF PLANETARY ULTRA-LOW- FREQUENCY ELECTROMAGNETIC WAVES IN THE IONOSPHERE AT INTERACTION WITH LOCAL INHOMOGENEOUS WINDS**

KH. CHARGAZIA

Tbilisi State University, Tbilisi, Georgia; M. Nodia Institute of Geophysics, Tbilisi, Georgia;  
E-mail: khatuna.chargazia@gmail.com.

The generation and further dynamics of planetary ULF electromagnetic waves are investigated in the rotating dissipative ionosphere in the presence of a smooth inhomogeneous zonal wind (shear flow). Planetary ULF waves appear as a result of interaction of medium with spatially inhomogeneous geomagnetic field. An effective linear mechanism responsible for intensification and mutual transformation of large scale electromagnetic fast and slow electromagnetic ULF waves is found. For shear flows, the operators of the linear problem are not self-adjoint, and therefore the correspondent eigenfunctions can be non-orthogonal and hardly be studied by the canonical modal approach. Hence it becomes necessary to use the so-called nonmodal mathematical analysis. The nonmodal approach shows that the transformation of wave disturbances in shear flows is due to the non-orthogonality of eigenfunctions of the problem in the conditions of linear dynamics. Thus there arises a new degree of freedom and the new way for the evolution of disturbances in the medium. Using numerical modeling, the peculiar features of the interaction of waves with the background flow as well as the mutual transformation of wave disturbances in the ionosphere are illustrated. It is established that the presence of a geomagnetic field, Hall and Pedersen currents in the ionospheric medium, improves the interaction and mutual energy exchange between waves and a shear flow.

Planetary electromagnetic wave, mean shear flow, mutual transformation of wave disturbances

Khatuna Chargazia, Tbilisi State University, M. Nodia Institute of geophysics, 0193 Tbilisi, Georgia; 1 Aleksidze str., Tel: 995 32 334186. 995 93 259252;  
E-mail: khatuna.chargazia@gmail.com