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Modeling generation of ULF electromagnetic waves by modulated heating of the ionospheric F2 region K. PAPADOPOULOS, BENGT ELIASSON, ARAM VARTANYAN, A.S. SHARMA, X. SHAO, G. MILIKH, Dept. of Physics and Astronomy, Univ. of Maryland — We present a theoretical and numerical study of the generation of ultra-low frequency (ULF) waves by the modulation of the electron pressure at the F2-region with an intense high-frequency electromagnetic wave. We develop a cold Hall MHD model that governs the dynamics of the shear Alfven and magnetosonic modes generated in the F2 region, of the damped modes in the diffusive Pedersen layer, and of the weakly damped helicon wave mode in the Hall-dominated E-region. A realistic profile of the ionospheric conductivities was used in the model. We studied the generation and dynamics of the low-frequency electromagnetic waves for different frequencies of the ULF waves. In particular we study the propagation and penetration of ULF electromagnetic fields and currents through the ionospheric layers to the ground. Different magnetic field configurations were studied and comparison between simulation with HAARP observation is also presented. The concept may constitute a means of injecting electromagnetic waves into the earth-ionosphere waveguide. This work is supported by ONR MURI grant.

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