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电离层人工调制激发的下行ELF/VLF波辐射

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The downward ELF/VLF waves radiation excited by ionospheric artificial modulation

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摘要 通过大功率ELF/VLF调幅高频波对电离层进行加热,形成电离层虚拟天线,可以作为发射ELF/VLF波的一种有效手段.本文使用汪枫(2009)的调制加热模型,计算高频加热电离层产生的低频辐射源强度,采用全波解算法分析辐射的低频波向下传播过程中的衰减和反射问题,并采用HAARP实验参数,模拟出在海面上接收到的低频信号强度为PT量级,与实验数据一致.模拟结果表明,加热泵波功率、低频调制波频率、以及加热纬度位置是影响ELF/VLF波辐射和传播的三个主要因素.

关键词: 电离层人工调制 ELF/VLF波辐射 全波解 HAARP实验

Abstract: By heating the ionosphere with large ELF/VLF-modulated HF wave, a virtual antenna is produced in the ionosphere, which is an effective means to radiate ELF/VLF waves. This paper uses the modulated-heating models of Wang Feng (2009) to calculate the strength of the LF radiation source produced by HF heating, uses full-wave model to analyze attenuation and reflection of the LF wave transmitting downward, and with HAARP experiment parameter, simulates magnetic field of the LF signals on the sea, which is in PT order, according with the experimental data.

Keywords: Ionosphere artificial modulation ELF/VLF wave radiation Full-wave model HAARP experiment

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