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大功率高频X波欠密加热电离层的理论与数值模拟

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Theory and numerical modeling of under-dense heating with powerful X-mode pump waves

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摘要

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摘要

基于电离层中电子的加热物理机制, 构建了左旋圆极化(X波)欠密加热理论仿真模型, 通过对已知实验的模拟验证了模型的正确性. 并利用此模型分析和研究了不同加热参数和背景参数对X波欠密加热效果的影响, 结果表明, 在X波欠密加热中, 加热效果随加热功率增加而增强, 随加热频率增加而减弱, 在相当的加热条件下, 背景电子温度越低、电子密度越小, 加热效果越强. 最后简单分析了X波欠密加热的一些应用.

关键词 [仿真模型](#), [欠密加热](#), [加热效应](#)

Abstract:

Based on mechanisms of both electron cooling and heating in the ionosphere, a theoretical model of under-dense heating by X-mode was constructed, and the accuracy of the model was verified by simulation of known experimental data. The influences of heating parameters and ambient ionosphere on the heating effect were analyzed and studied by using this model. The results show that, the heating effects will increase with the Effective Radiated Power (ERP) increase, will weaken with heating frequency, when under-dense heating ionosphere by power X wave, furthermore, the electron temperature and density are lower, the heating effects are stronger. Finally, some applications of under-dense heating using X wave were analyzed.

Keywords [Simulation mode](#), [Under-dense heating](#), [Heating effects](#)

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