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电离层星载阻滞势分析器的误差仿真分析

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Simulation analysis of errors from ionosphere satellite-borne retarding potential analyzer

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摘要 阻滞势分析器经过半个世纪的发展,在国际上已经成为就位探测电离层离子密度、离子温度和离子速度的重要手段.本文
滞势分析器的工作原理,建立了多种仿真模型,从微观上比较几种模型对粒子的作用特性.栅网和等离子体鞘层是影响阻滞势分
的主要因素,本文重点研究了这两个因素对离子透过率的影响,分析发现鞘层电场会进一步影响栅网的电场畸变,从而加剧栅网
的"聚焦"作用.最后,我们通过仿真生成伏安特性曲线,利用理想模型公式进行最小二乘拟合并获得离子参数,对两种模型在不同
时离子密度、离子温度和离子法向速度的探测误差做出了分析.

关键词: 阻滞势分析器 电离层 栅网 误差 仿真分析

Abstract: Retarding Potential Analyzers (RPA) have been used extensively over the past half century t
in-situ diagnostics of ion density, ion temperatures and ion velocities. The non-ideal grids and plasma sh
the most important considerations which may cause significant errors in inferred parameters. We compar
transparency of several models which are created based on real instruments. We found that the sheath
field can enhance the lensing effect of the grids which leads to changing in transparency for particles. It
were created over different values of ion temperatures, and a study on errors in inferred parameters for
different models was presented and compared to other people's work.

Keywords: RPA Ionosphere Grids Error Simulation