

论文

## 计算索末菲尔德型积分的新方法--球面波级数展开法

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摘要

利用广义阻抗边界条件模拟和简化地球表面对电磁场的影响。应用圆柱波函数的球面波展开表达式, 地平面上方水平电偶极子电磁场中的索末菲尔德型积分可表达成快速、绝对收敛的球面波展开式, 利用积分路径的变换和超几何函数理论, 展开式中的展开系数可表达成以大地表面复阻抗为宗量的第二类勒让德函数。该展开式数学物理意义明显, 并且十分便于数值计算, 该文给出的方法是求解下索末菲尔德半空间问题的精确、有效解析方法。

关键词 [电磁场理论](#) [索末菲尔德型积分](#) [广义阻抗边界条件](#) [球面波展开](#)

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## A new technique for computing sommerfeld type integrals-expansion of spherical wave functions

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Abstract

Generalized impedance boundary conditions are employed to simulate the effect of the earth's surface on electromagnetic fields. The Sommerfeld type integrals contained in the electromagnetic fields of a horizontal electric dipole over the ground plane are expressed as a rapidly and absolutely convergent expansion of spherical wave functions; and the coefficients of the series are cast into the Legendre functions with argument for the complex surface impedance of the ground with the help of the techniques of the transformation of integration path and the hypergeometric functions. The obtained results have explicit mathematical and physical interpretation and can conveniently be used to calculate the fields. The technique described here is an accurate and efficient computation for the Sommerfeld type integrals.

Key words [Electromagnetic theory](#) [Sommerfeld type integrals](#) [Generalized impedance boundary conditions](#) [Expansion of spherical wave functions](#)

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