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飞行器翼身结合部的散射特性分析

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ANALYSIS OF BACKSCATTERING FROM WING AND FUSELAGE JOINTS

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摘要 飞行器翼身结合部构成的两面角反射器是一个很强的电磁散射源,但由于其一个表面弯曲,分析这种结构的散射十分困难。采用复射线展开法和几何绕射法分别处理镜面多次反射和边缘绕射,计算了这种复杂结构产生的电磁散射和雷达截面贡献,分析了翼身两面角和机身半径等几何参数对目标雷达截面的影响。结果表明是一种有效的雷达截面预估方法,通过结构几何参数的计算机优化,可以显著地减小翼身结合部的雷达截面贡献。

关键词： 雷达截面 复射线理论 场的展开

Abstract： The dihedral reflector with wing and fuselage joint is a very strong electromagnetic scattering source in a wide angular region. The prediction of the electromagnetic scattering and radar cross section from this construction, however, is a complicated theoretical problem, because one of the dihedral surfaces is curved. In this paper, the problem is analysed and calculated by the method of complex ray expansion combined with geometrical theory of diffraction, respectively dealing with the specular multi-reflections and the edge diffractions. The influence of the geometrical parameters of the construction, such as the angle between wing and fuselage, the radius of airframe, on the radar cross section of target is evaluated numerically. The obtained results show that the presente'd method is an effective approach to the radar cross section prediction, and the scattering contribution from the wing-fuselage dihedral can be reduced substantially by the computer optimization of geometrical construction.

Keywords： radar cross section   complex ray theory   wave expansion

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