论文

大型宽带反射面天线的机电耦合分析

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摘要：

大型宽带反射面天线的机电耦合分析中，存在结构网格和电磁网格不匹配，不同频段分析需要不同的网格等问题．针对这些问题，使用口径面法建立机电耦合模型；从结构网格出发，推导结构网格和电磁网格之间的转换矩阵；根据不同频段电磁分析要求，确定计算结点数目．使用网格转换矩阵结合三角形单元的Gauss积分公式分析大型宽带反射面天线的机电耦合模型．相对于使用FEKO软件，避免了繁琐的网格处理，节省了计算时间；相对于常用的积分方法，有更高的计算精度．仿真实例表明该分析方法是正确的和有效的，能够用于大型宽带反射面天线的机电耦合分析．并将该方法应用于某40 m抛物面天线工程中，分析结果与工程实际经验符合．

关键词： 反射面天线　机电耦合　网格转换矩阵　Gauss积分公式

Electromechanical coupled analysis of large broad band reflector antennas

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Abstract:

In the electromechanical coupled analysis of large broad band reflecort antennas, the mesh for structure analysis does not match the mesh for electromagnetism analysis, and diffrerent meshes are requied for diffreent frequencies. For these problemes, the GO method is used for modeling the electromechanical coupled model. A transformation matrix for different meshes has been deducted starting with the structure mesh. The number of nodes for electromagnetism analysis is ensured according to the frequency. This transformation matrix and improved Gaussian integral formula are used to analyze reflecort antennas. Compared with electromagnetism software, a fussy process for girding is avoidable, and much time is saved in computing. Compared with the traditional integral formula, an elevation in computing precision is obvious. Results of simulation demonstrate that the transformation matrix is very accurate and efficient, ant that it could be used in electromechanical coupled analysis of large broad band reflecort antennas. Finally, the mothod presented in this paper is used for a 40 m reflector antenna, with the result accord with practical engineering experience.

Keywords: reflector antenna　electromechanical coupled　transformation matrix　Gaussian integral formula

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