辅助激励源区域分解算法在电磁散射问题中的应用

安翔1, 吕志清2, 梁昌洪1

(1.西安电子科技大学 天线与微波技术重点实验室，陕西 西安 710071；2.东南大学 毫米波国家重点实验室，江苏 南京 210096)

摘要　针对电大问题，提出了一种基于辅助激励源的区域分解算法．首先把原求解区域划分成若干个子区域，显著地降低了原问题的规模和复杂度．在子区域分界面上引入虚拟的辅助激励源以交换信息，建立了相应的矩阵方程及其快速求解算法．一旦获得了辅助激励源，即可并行地计算各子区域内部的场．与传统算法相比，该算法有效地提高了计算效率和计算精度，降低了存储量;此外，它特别适合于求解具有几何重复性特征的结构，如栅格、光子带隙/电磁带隙、频率选择表面等．

关键词　区域分解算法　辅助激励源　电磁散射

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The auxiliary excitation source domain decomposition method and its application in electromagnetics scattering problems

AN Xiang1, Lü Zhi-qing2, LIANG Chang-hong1

(1. Key Lab. of Antenna and Microwave Technology, Xidian Univ., Xi′an 710071， China;2. State Key Lab. of Millimeter Waves, Southeast Univ., Nanjing 210096， China)

Abstract

A highly efficient Domain Decomposition Method (DDM) based on the auxiliary excitation source algorithm is presented for solving electrically large electromagnetics scattering problems. The original domain is partitioned into nonoverlapping subdomains to reduce the computational scale and complexity. To ensure the convergence of the algorithm, an auxiliary excitation source is used to exchange information between subdomains. The resulting linear system of equations for the auxiliary excitation source is established and solved with a fast algorithm. Once the auxiliary excitation source is obtained, the field on each subdomain can be computed independently. Compared with the traditional method, the proposed method can not only improve the computation efficiency greatly, but also decrease the memory requirement and the computational errors significantly. Moreover, it is especially appealing for problems with geometric repetitions, such as, gratings, photonic/electromagnetic band gap structures (PBG/EBG), and frequency selective surfaces (FSS).

Key words　domain decomposition method　auxiliary excitation source　electromagnetics scattering

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通讯作者

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