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TDPO及其并行算法在电磁散射中的应用

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摘要 为分析电大尺寸金属目标瞬态电磁特性，首先由逆傅里叶变换导出时域物理光学表达式，并对内存估计作了详细讨论。在此基础上，实现了基于网络并行平台MPI的TDPO并行算法，以解决利用TDPO计算超电大尺寸目标时计算时间长和由于内存限制单个微机不能计算的问题。测试了PC集群系统中并行TDPO算法的并行加速比。数值结果表明，N个性能相同的微机并行计算所需时间约为单机的1/N，大大提高了计算效率。

关键词 时域物理光学 并行算法 超大电尺寸目标 电磁散射

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An application of TDPO and its Parallel algorithm to the analysis of electromagnetic scattering

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Abstract

The Time Domain Physical Optics (TDPO) approach is developed for the analysis of transient scattering by electrically large PEC objects. The development is based on the inverse Fourier transformation of the frequency domain physical optical expression. The estimation of required computer memory is discussed. Too much time and prohibitive computation resources are needed for the analysis of electromagnetic characteristics of electrically ultra-large objects. To overcome this drawback, a parallel algorithm that combines TDPO and MPI function is presented. Numerical results show that the speed-up ratio is approximately equal to N, where N is the number of processors, illustrating the high efficiency and good performance of the parallel TDPO.

Key words time domain physical optics parallel algorithm electrically ultra-large objects electromagnetic scattering

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